The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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British Rail Exports.

A correspondent of the London *Colliery Guardian*, who has apparently given some attention to the condition of the British rail market, writes as follows:

In the official returns of the Board of Trade of the exports of iron and steel rails we have one of the most reliable of the tests of the condition of the iron trade. We export, on an average, over 60,000 tons of rails monthly, so that it will be seen that there is a very large consumption of iron in the production of these rails, and that the export rail trade is one of those that are of the utmost value to the crude-iron industries and to the men who depend upon them. In the first four months of the present year we exported only 11,087 tons of iron rails—a very large declension if the quantity exported in previous corresponding periods be taken into account. This may be proved by the citation of the fact that in the first four months of last year the exports of this class of rails were to the amount of 26,067 tons—so that, in one year, there is a fall of more than one-half. The export of steel rails, as we shall find, is in a different condition. Looking, however, a moment more at the exports of iron rails, we find that in the four months we sent slightly more this year to Italy, Chili and Australasia than last year, and to one or two countries that are grouped together in the return, but to all other countries, including the United States, our exports dwindled in that period. It is apparent, then, that we are sending much less iron rails to the chief of the countries that we were wont to supply, so that they are either buying other kinds or elsewhere. The value of the iron rails that we export, ton for ton, does not very greatly vary from year to year, but the total value necessarily falls with the quantity of rails that we export.

If we turn to the steel-rail trade we have a much more favorable report. In the first four months of last year the exports of steel rails were 222,642 tons, but for the first four months of the present year the exports had risen to 246,536 tons, so that in point of quantity the increased export of steel rails more than made up for the falling off in the export of iron rails, and left the total of both kinds to show an increase of about 9000 tons for the four months of the year. But the value does not show the same results, for while the value of the rails of both classes exported in the first four months of last year was £1,626,157, the value of the exports for the first four months of the present year was only £1,565,460, so that there has been a declension in the average price of the rails that have been exported this year. Of steel rails, this year, none have been sent so far to Russia, though 152 tons had been sent last year; but this may be due to the lateness of the opening of the Northern navigation. To Spain, Italy, Chili, British North America, India and Australasia there is an increase, as well as to the countries that are not specifically named, but there is a serious fall in the exports to the United States and to Brazil—the former country having received 17,000 tons this year against 70,000 tons last year. It is noticeable that the exports both of iron and steel rails "to other countries" than those specifically named show a large increase. Of steel rails nearly one-third are sent to the countries thus grouped, and of iron rails considerably more than a third, so that it is evident that the table that is issued needs revision. We are losing some of our old customers for rails—Germany has practically ceased to buy rails from us, yet her name is in the list, though there are generally no figures attached to it, while the names of some of the largest of our consumers are grouped under the head of "other countries." A rearrangement of the table would be of value to those who peruse these statistics, and would enable the readers to better learn who are now the chief of the buyers of rails from this country.

It cannot be said that the returns to which we have referred should give unmixed satisfaction to those who are interested in the rail trade. On the one hand we have to show a slight increase in the quantity of our exports, but on the other hand we have to record a fall in the value of these exports. It is evident, then, that the price is falling, and it is also plain that we are losing our customers for rails in the North of Europe. Possibly this may be due to the fact that a vast amount of country in these parts is now practically fully served with railways—as fully, that is, as the trade needs, and as there is ability to construct. There is also a growth of the rail manufacture in many of the countries that were once our customers, and they very naturally use their own productions. But we are developing a trade with our Colonies, and that to a very large extent. We have also from period to period a fitful trade with the United States. Although that country has now an enormous productive power, in periods of great railway making there is a demand that all its mills cannot supply, and thus a call arises for the mills of Europe, and of this we have so far had the chief share when it is known. It is not a demand that can be depended upon, but it is one that arises from period to period, though it possibly is less and less as the mills of the States grow larger and able to produce more.

The future of the rail trade is one that is not very easy to foresee. We may expect that with the increasing prosperity of our Colonies there will be larger demands upon us for rails, and there are many countries that cannot be said to be fully served with railways—some, indeed, that are barely yet tapped for the traffic that they may in the future yield. It is evident, also, that there must be, with the growth of the railways both at home and abroad, with the increase of the traffic in bulk upon them, and with the increase of the speed of that traffic, a continuous and great growth of the demand for rails for renewals—a demand that is, however, slight to that which has been known in the past, and should be known in the future, for rails for new railways. As the latter—in some distant future—dies off, the former should be expected to grow; but we are as yet a long way from this. There are wide areas of the world that still need railways, and it is in the provision of the rails for those that our rail mills must first look. The trade with our Colonies shows signs of healthy growth, and there is a growing trade with Africa and other parts of the great continents that are still only partly served with railways. In the cultivation of the trade there is before our railmakers an ample field. It is true that there is growing competition, but the abundant supplies that we have of iron and coal, and the skill of our men, as well as the abundance of capital—these should give us the largest share of the rail trade of the world still, despite the growth of that competition.

Professor Huxley, in an address at the International Fisheries Exhibition, pointed out that an acre of good fishing ground will yield more food in a week than an acre of the best land will yield in a year. Still more striking was his picture of the moving "mountain of cod," 120 to 130 feet in hight, which for two months in every year moves westward and southward past the Norwegian coast. Every square mile of this colossal column of fish contains 120,000,000, consuming every week, when on short rations, no fewer than 840,000,000 of herrings. The whole catch of the Norwegian fisheries never exceeds in a year more than half a square mile of this "cod mountain," and one week's supply of the herrings are needed to keep that area of cod from starving.

The Mallett System of Controlled Combustion.

The Mallett system of controlled combustion, for which an increased efficiency in evaporation and smoke prevention are claimed, is apparently making slow but steady progress. The system as originally brought forward was the adaptation of its principles to boilers in place; now, however, the company which have been recently organized to work under Mr. Mallett's patents are manufacturing boilers exclusively adapted to this process. The fundamental principle of the system, "the regulation of the amount of air supplied to the ash-pit and combustion chamber to induce a complete combustion to carbonic acid," is still held, and the changes that have been made are purely mechanical.

Mr. E. E. Magovern, who recently had occasion to inspect the working of the system as now employed upon the steamer Cement Rock, plying upon the East River, submits the following particulars in *Mechanics*:

To facilitate inspection, the boiler is placed directly upon the deck of the vessel, and is entirely destitute of protection or clothing of any kind. The boiler is a modification of the common locomotive type, as shown in the engravings. In order to allow the reader to form some comparison of details between this and the ordinary locomotive boiler, the following principal dimensions are taken from the company's circular: External diameter of shell, 4 feet 8 inches; external width of fire-box, 4 feet 8 inches; external length of fire-box, 6 feet 2 inches; diameter of combustion chamber, 3 feet; length of shell, 12 feet; length of superheater chamber, 1 foot; length of superheater, 3 feet; length of fan and air-chamber, 2 feet; length over all, 24 feet; length of tubes between sheets, 7 feet; outside diameter of tubes, 3¼ inches; inside diameter of tubes, 3 inches; distance between centers of tubes, 4 inches; length of fire-box at bottom, inside, 5 feet 6 inches; width of fire-box at bottom, inside, 4 feet; hight of crown sheet above top of grates, 4 feet 9 inches; hight of space above crown sheet, 1 foot 2 inches; hight of steam dome, 2 feet 6 inches; diameter of steam dome, 3 feet; diameter of opening of safety valve, 3½ inches; hight of fire-door openings, 1 foot; width of same, 1 foot 2 inches; thickness of plate in shell and dome and on outside fire-box slope, ⅜ inch; thickness of plate in fire-box sheet, front, back, crown and sheet sides, $\frac{7}{16}$ inch; thickness of tube sheets, ½ inch; heating surfaces of tubes, external, 333.52 square feet; internal, 309.43 square feet; of fire-box, 94.83 square feet; of superheater, 195.82; of combustion chamber, 51.13; combined area of tubes in boiler, 2 feet 6 inches; fire grate area, 22 square feet; total heating surface in boiler, 664.14 square feet; number of tubes, 56; grate to heating surface, 30.18; tube area to grate area, 8.42.

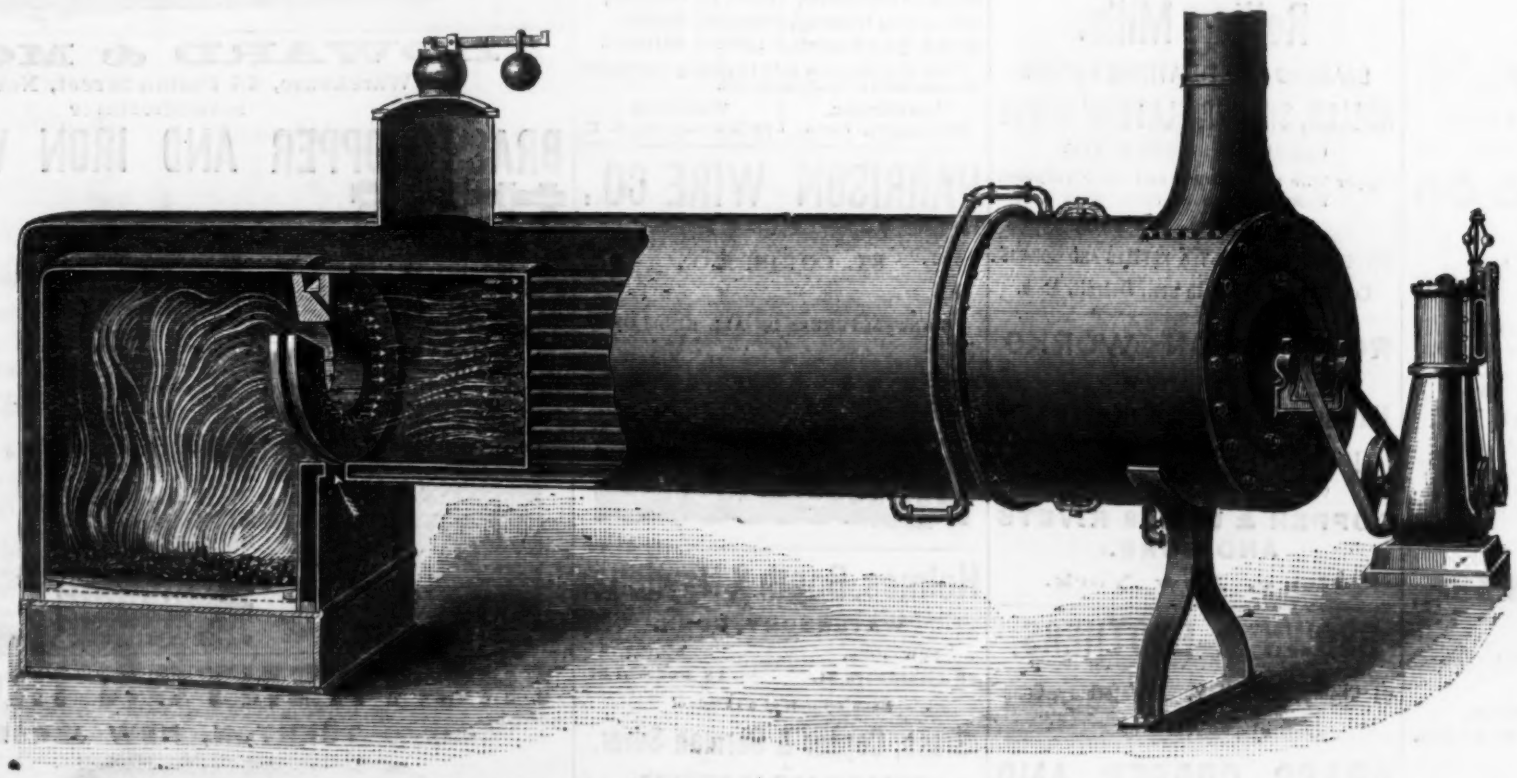

Fig. 1.—Perspective View and Section Showing Annular Septum Wall.

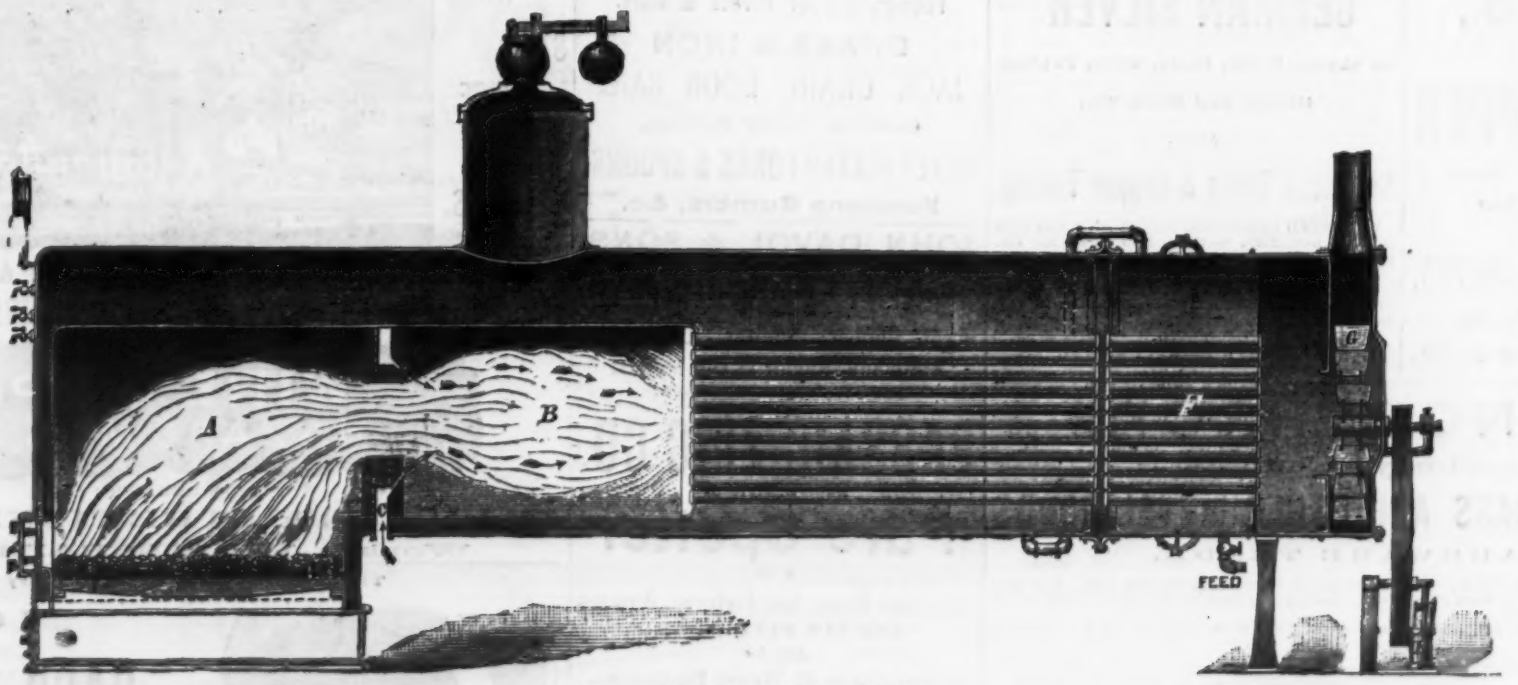

Fig. 2.—Longitudinal Section of Boiler.

According to the makers' rule of classification, viz., 15 square feet of heating surface to the horse-power, this boiler, having 664 square feet of heating surface, would be rated as about 45 horse-power. A more exact way to determine its capacity, when under ordinary conditions as to setting and using chimney draft, is as follows: Assume that the combustion amounts to 12 pounds of fuel per square foot of grate surface per hour; this, on an area of 22 square feet, gives us 264 pounds of fuel burned on the grate per hour. Assuming the evaporative efficiency of an ordinary locomotive boiler, viz., 8 pounds of water per pound of coal, gives 2112 pounds of water evaporated per hour. Assuming, further, 30 pounds of feed to the horse-power, would make the boiler 79½ horse-power.

In a circular issued by the Control Combustion Co. it is claimed that "this size boiler evaporates without forcing 4400 pounds of water per hour, developing with an average engine 146.6 horse-power." If this is granted, it is very evident that an increase in boiler capacity is upward of 100 per cent.

In the system when first brought out the septum wall, separating the fire-box from the combustion chamber, was made of brick pierced with square holes, to furnish the furnace gases with access to the combustion chamber; the air to complete the combustion was admitted to the combustion chamber by hollow grate bars. In the latter system the septum wall is replaced by the annular throat shown in our engravings.

The longitudinal section of the boiler is shown in Fig 2. The separation between the fire-box A and the combustion chamber B is effected by means of an annular perforated throat, or, as it is called, septum. The effect of this throat is to converge and contract the fuel gases generated in the fire-box. While the fuel gases are thus focused, so to speak, the perforations in the throat permit highly heated air jets to enter in a complete circle, thus penetrating the core of the flaming gases at their most contracted and hottest point, simulating in every respect the action of an Argand burner. The fuel gases thus thoroughly incorporated with heated air in controlled quantities enter the combustion chamber B, where the gases become burned and not extinguished, as they would be if they entered the boiler tubes on leaving the fire-box, as is usual.

Owing to the introduction of the rocking grate (a feature well calculated to increase the efficiency of the system, by checking losses due to the entrance of cold air to the fire-box when cleaning and raking fires), the hollow grate-bars were dispensed with. The quantity of air gaining access to the fuel and fuel gases is regulated, as before, by registers; a definite amount is allowed to enter the ash-pit, and an additional supply streams through the annular throat. When bituminous coal or wood is charged into the fire-box, the air supply to the ash-pit is cut off by a sliding register, actuated by a lever, the

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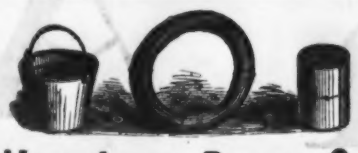

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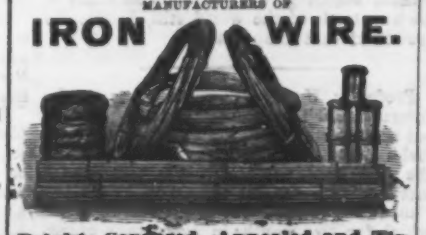

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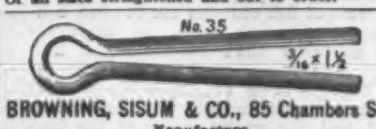

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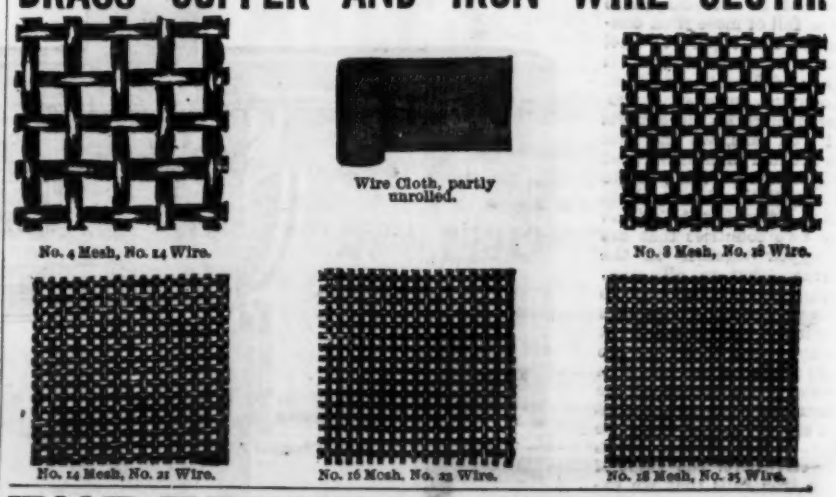
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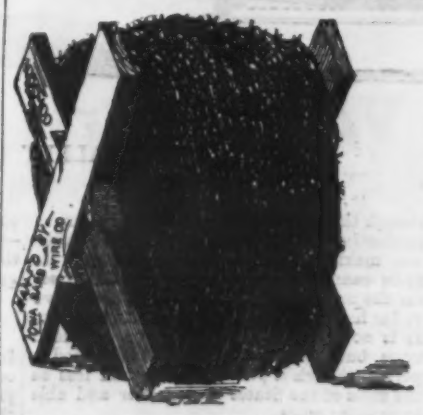

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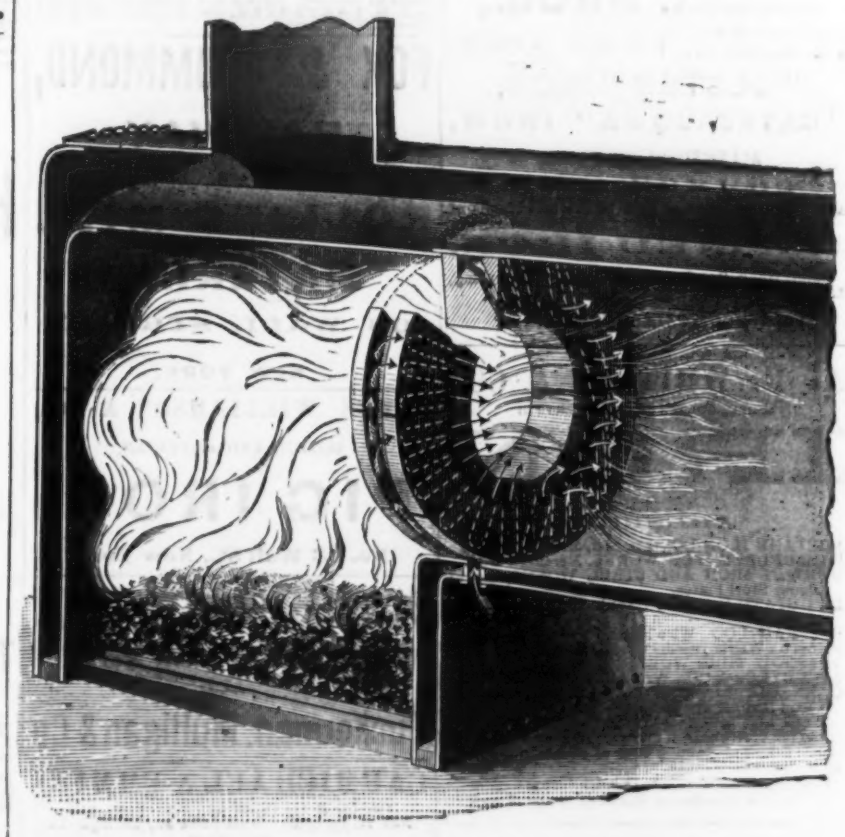
register being situated directly below the septum, as can be seen in the engravings. The fresh fuel, not receiving any air, does not burn, but from the heat of the fire begins to distill, as it would in a gas retort. Owing to this absence of air to burn the fuel, together with diminished air tension within the fire-box, the fuel begins to distill without producing smoke. The fuel gases generated at this time are drawn through the Argand throat of the boiler, incorporated with hot air and immediately burned. By one motion of the lever the air supplied to the ash-pit through the register and to the combustion chamber is simultaneously regulated, so that, as more air enters the one, less will enter the other, and *vice versa*. It is thus that while the total supply of air to the fuel can remain constant, the ratio of the amount supplied to the solid fuel and to the fuel gases can be changed to conform with the greater or less amount of fuel gases produced at different stages of the combustion.

Figs. 1 and 3 show perspective views of the annular septum or throat which separates the fire-box from the combustion chamber. Fresh air entering the opening which passes through the water space of the boiler, and indicated by the arrow, is drawn into the peripheral channel of the brick throat, from whence the highly-heated air enters the flame current radially through a series of jet orifices which communicate with the circular



Mallett System of Controlled Combustion.—Fig. 3.—Section Through Fire-box, Showing Septum Wall.

channel. The thorough incorporation of air and fuel gases, which could not be produced in any other manner, insures that perfect combustion familiarly seen in the Argand burner, and hence the name of "Argand boiler." Although this boiler is internally fired, it possesses a combustion chamber universally recognized as essential to perfect combustion, but, nevertheless, always absent in the locomotive type of boiler. This innovation, together with the admittance of air into the interior of the boiler in the manner described, really stamps the Argand as a new type of boiler. After the products of combustion pass through the boiler tubes proper, they enter the superheater F, Fig. 2. This is a supplementary boiler, and because the average temperature of the water it contains is much below that of the water in the boiler proper, it abstracts more heat from the waste products. This result is hightened by the moistening of the waste gases by the exhaust steam of the engine, because moist air radiates its heat more rapidly than dry air.

This superheater supplants the "condenser" originally used. This is, without doubt, a decided improvement, and the introduction of the exhaust steam into the superheater is, to say the least, a mechanical novelty based upon well known correct physical phenomena.

The introduction of the fan into the smoke-box is an improvement rendering the apparatus more compact. This superheater will act also as a feed-water purifier. It is a well-known fact that water, after being heated slightly above the boiling point, deposits many of its saline impurities. This is notably the case with the sulphate of lime, which is nearly always the principal impurity which is deposited in the form of scale when the water in the boiler becomes supersaturated. After passing through the superheater the waste gases enter the exhaust fan G, Fig. 2, from whence they can at once escape into the open air, or be conducted through a comparatively small pipe to the chimney or flue. It will be well to notice that the position of the fan when at rest offers no obstruction to whatever draft may exist at the back connection of the boiler, either when a short pipe is carried to the open air or when the gases pass off by a chimney. Therefore, when only one boiler is used, steam can always be raised by merely starting a fire, without the fan. As only a few pounds pressure are required to start the small engine, the fan will begin to operate very quickly. There will always be found more than sufficient steam, however, every morning, with a banked fire, to start the engine. There is no smoke during the generation of steam by this system, and as the inventor of the system once stated, they do not attempt to burn smoke, when once made, but endeavor to burn fuel so as to produce no smoke.

The Steel Cruisers.

Secretary Chandler had $320,000 in certified checks and 16 bids for the construction of the new steel cruisers. At 12 o'clock, July 2, the long, handsome room in the new Navy Department where Secretary Chandler transacts his official business was half-filled with gentlemen interested in the new steel cruisers. The Naval Advisory Board were there, and representatives from all the great shipbuilding firms, except the company over which Mr. Gorringe presides, and Pusey & Jones, of Wilmington, who had announced their intention not to bid. Promptly at noon Secretary Chandler made a little speech to the bidders, rehearsing the familiar history of the present attempt to get a few good ships for the navy, and recalling the terms of the oft-published advertisement. He had the ears of his little audience, but their eyes were fixed on the enveloped bids lying on the Secretary's desk. They did not have to wait long. As soon as the Secretary finished, a member of the Advisory Board began to break the seals and read the bids. For the 4500-ton steel cruiser, C. H. Delameter & Co., New York, bid $1,163,000; the Harlan & Hollingsworth Co., Wilmington, $1,120,000; Cramp & Son, Philadelphia, $1,080,000; John Roach, Chester, $889,000. Each bidder sent in a $30,000 certified check with his bid. For the 3000-ton steel cruiser the following bids were made: The Harlan & Hollingsworth Co., $777,000; Harris, Loring & Co., Boston, $748,000; Cramp & Son, $650,000; John Roach & Son, $619,000. Each bidder sent in a $20,000 check. For the 3000-ton cruiser the following bids were made: Harlan & Hollingsworth Co., $775,000; Quintard Iron Co., New York, $763,400; Cramp & Sons, $650,000; John Roach, $617,000. Each bidder sent in a $20,000 check. For the dispatch boat bids were made: H. A. Ramsey & Co., Baltimore, $420,000; Allen & Blaisdale, St. Louis, $380,000; Cramp & Son, $375,000; John Roach, $315,000. Each bidder sent in a $10,000 check. When the bids had been read, Rear-Admiral Shufeldt, President of the Naval Advisory Board, examined the certified checks. The bids and the checks were pronounced in good form. The checks were pinned to the bids, the latter were deposited in a polished mahogany dispatch box with bright brass handle, and the lid was locked. Then Secretary Chandler said: "Gentlemen, the contracts will not be awarded to-day." With this benediction conversation became general.

Revival of Railroad Building in Dakota.—The location of Dakota's capital at Bismarck, says the *Northwestern Lumberman*, is likely to conduce to the revival of railroad building in that Territory, for the leading companies whose roads penetrate Dakota to the southward will be anxious to reach the capital and the Northern-Pacific connection at that point. It is announced that the Chicago, Milwaukee and St. Paul Co. have begun construction on their branch from Lechter to Ashton, Dakota, a distance of 75 miles, which will be completed about the last of August. This line will connect Mitchell and Aberdeen, and by fall Mitchell and Bismarck will be linked together. Arrangements have already been completed for continuing the Milwaukee road from Mitchell south to Scotland. The Northwestern Co. have also a plan for extension to Bismarck and the Black Hills, and both the rival roads will compete vigorously for Dakota traffic by extending their systems. The prospects for railroad building in Dakota are great, and its effect will be to increase the lumber trade in the Territory.

Messrs. Nenjean & Delaite, of Liège, have devised the following process for coating with zinc large pieces that can be moved only with difficulty, much less immersed in a bath of molten metal. Zinc, reduced to fine powder, is mixed with linseed oil and driers, forming a paint, which is laid on with a brush in the ordinary way. A single coat is sufficient to prevent oxidation; but it is better to employ two, so as to avoid missing any parts. The articles thus treated have an iron-gray tint, in which state they may be left, or they may be subsequently bronzed, or painted with lead color of any shades.

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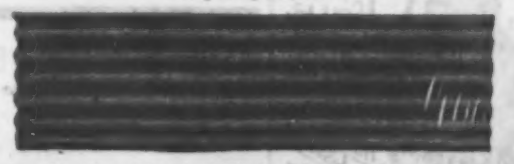

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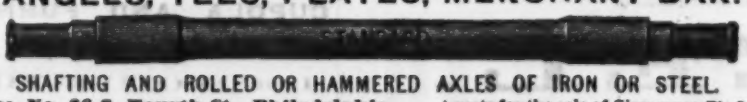
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Improvements in Locomotives.

At the 16th annual convention of the Master Mechanics' Association, recently held in Chicago, Mr. F. W. Dean read the paper given below, and which, though it may express some views conflicting with those generally entertained, will nevertheless be found interesting and instructive in many particulars. Mr. Dean remarked that the locomotive has always been a fascinating machine to nearly all persons from boyhood up. The question of appearance often caused design to be sacrificed to it, and even to this day there are many locomotives running which indicate that there is not only some of the feeling referred to existing, but that the designers are not well versed in first-rate principles of machine design and constructive mechanical engineering. At least one road in this country can be pointed out on which many parts are fastened together with stud and tap bolts put in the most invisible and inaccessible places, giving the engine the the appearance of being to some extent glued together. Not only this, but the amount of bright finish on the engines is absurdly great. Nothing of the sort will be found on a Sellers, Bement or Whitworth machine, and it would be difficult to say why a locomotive should be differently treated.

Some of the principles which should be kept in view in designing a locomotive are simplicity, directness, convenience in manufacturing, inspecting and repairing. A locomotive or other machine should be as smooth and free from projections of all sorts as possible, so long as these features are not inconsistent with the efficiency of the machine. In particular, all nuts and other parts should be conveniently placed, and no attempt should be made to conceal anything, for the minute this is done there enters what may aptly be termed mechanical immorality. The means which we employ to fasten parts together are the best we have, and should be honestly used. The beauty of a machine consists largely in the propriety of the design, and any departure from propriety is a caricature. Mr. Dean believed that sand boxes and dome covers should be perfectly smooth and without moldings. They should have hemispherical tops, and should flare out to join the boiler. In this particular Mr. Ely, the late Howard Fry and Mr. Lander have set good examples. The forms of cylinder casing should receive more attention. This should be entirely without moldings, should have flat ends, and the parts joined should be flush with each other. It would be well to consider whether, for the sake of simplicity at least, cylinder heads without casings cannot be used with advantage more than they are at present. If they were used in conjunction with solid web pistons, which will be noticed further on, they could be made hollow, thus giving an air space for the non-conduction of heat. The objections to this construction are the cost of founding and the weight. On the other hand, the gain in strength due to this form, when the two webs are connected by ribs, may be an important advantage with the increasing steam pressures which are sure to follow the few leading instances of it which we now have.

Occasionally we hear of the burning of locomotive cabs. In England and on the Continent of Europe, as most of us know, iron is always used for cabs of a thickness of about $\frac{1}{8}$ inch. The roof is sometimes made of wood, easily detachable from the sides and front, and is covered with some waterproof material. This overcomes the objection that an iron cab would be noisy in rainy weather, but the objection that it would be cold in winter and hot in summer may have considerable force. The weight of an iron cab would be an advantage in these days.

Speaking of the American locomotive, Mr. Dean pronounced it to be a remarkably wasteful machine, both in the use of the fuel and the use of the steam after it is generated. It is to be regretted that we have few, if any, records of a first-rate series of experiments to show just what our best locomotives are doing, and it is to be hoped that some of our leading railroad companies will soon employ thoroughly competent experts to make experiments on the matter. That there is room for improvement none will doubt. There are locomotives burning as much as 95 pounds, and even more, of coal per square foot of grate area per hour, which is undoubtedly a very wasteful rate. To show how economical a locomotive can be, Mr. Dean had some figures which were furnished to him by Mr. Patrick Stirling, locomotive superintendent of the Great Northern Railway of England, giving the results of a series of experiments made by him with one of his 8 feet 1 inch single pair of driving wheels locomotives, having cylinders 18 by 28 inches. These experiments were undertaken for Mr. Wright, chief engineer of the British navy, when the introduction of locomotive boilers into the English navy for torpedo boats was contemplated. They extended over a period of a month, and were during ordinary working. The following is an abstract of the result:

Distance travelled daily	192 miles
Weight of train, tender and engine	213 tons
Average speed per hour	50 miles
Fuel used per mile, including getting up steam	28 pounds
Fuel per indicated horse-power per hour	2.01 pounds
Water evaporated per pound of coals	9.58 pounds
Steam pressure per square inch	140 pounds

Comparing some of these figures with similar ones in this country, there is a striking difference. The following seem to be representatives in this country for a train of, say, 350 tons, including the locomotive and tender, viz.:

Average speed per hour	35 miles
Fuel per mile	50 pounds
Fuel per I. H. P. per hour	4¾ pounds
Water evaporated per pound of fuel	6 to 7 pounds
Coal burnt per square foot of grate area per hour	110 pounds

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In seeking the cause of the great consumption of fuel in our locomotives, we must recognize the fact that they are pushed frequently to their utmost capacity, and it is evident that the tremendous rapidity with which the combustion takes place is chiefly responsible for it. In stationary practice,

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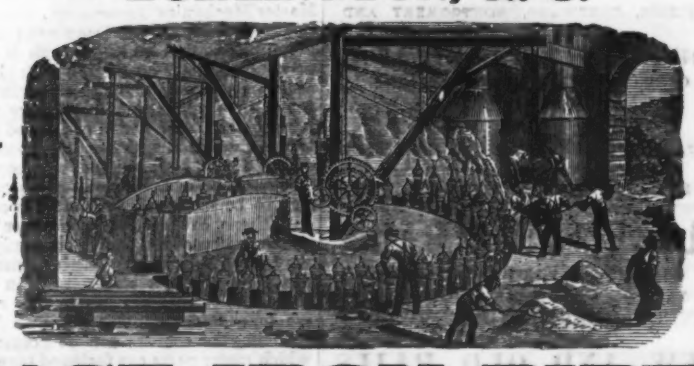

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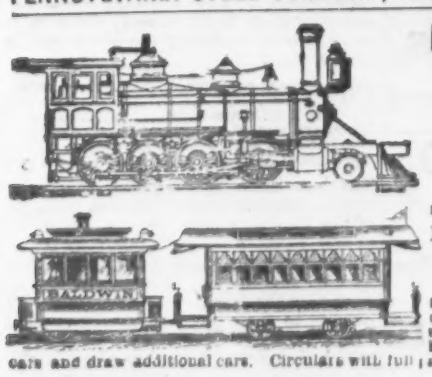

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consumption of more than 40 pounds of coal per square foot of grate area per hour is unusual, while in locomotives as much as 130 pounds is sometimes burnt. The chief cure for this evil is an increase of grate area, and this can be accomplished (while keeping the fire-box between the axles) by using a plate frame 1⅛ inches thick, and the Joy valve gear, which allows the fire-box to be brought up close to the forward driving axle. In this way the width of a fire-box can be increased 5¾ inches over the usual width with bar frames, and the length can be made 84 inches, giving a grate 84 inches by 41 inches, the area of which is 23.9 square feet against 17.6 square feet, the amount usually found in locomotives with their driving-axle centers 8 feet 6 inches apart. This is a gain of 6.3 square feet, or almost 36 per cent. If, now, an engine with the smaller grate area should burn 100 pounds of coal per square foot of grate area per hour, a similar engine with the larger grate area, but burning the same total amount of fuel, would burn only about 75 pounds per foot of grate. The consequence of this slower rate of combustion would be that a larger exhaust nozzle could be used, less coal would be pulled through the tubes, fewer sparks would be sent out of the chimney, there would be less back-pressure in the cylinders, and a considerable gain in economy would result.

The recent extensions of smoke boxes to catch cinders seem to be a decided im-provement, but this is attacking the problem at the wrong end. The combination of the deflector and brick arch is undoubtedly very efficient in promoting complete combustion and in retaining the particles of coal in the fire-box which would otherwise be taken along by the strong draft. It appears to be a fact that enough air to support combustion cannot be admitted through the grate, and therefore it is advisable to run with the furnace door a little open in order to supply the deficiency. This air should be spread outward in all directions by the deflector, to meet the gases which are thrown forward by the arch. In order that this process may be most perfectly carried out, the door should have the hinges at the bottom, and it should open at the top, or, if it opens at the side, which is more convenient, it should be in two parts, the upper part being hinged to the lower, and capable of turning back under control of a latch. In this way a thin film of air can be admitted and both sides of the fire treated alike. Great difficulty has been experienced in the maintenance of deflectors on account of their rapidly burning out. Mr. Dean, however, believes that this can be completely overcome, if not by fire-brick resting on water tubes, as described by Mr. Fry last year, by a water-space deflector, either cast whole or made of boiler plate. The water space could be made of any thickness, and circulation could be maintained by connecting the lower part of it by means of pipes to the coolest part of the fire-box water space, and the upper part to the crown sheet. From experience on the Old Colony Railroad with steel water-space arches in place of brick arches, it may be anticipated that a deflector made as described, if provided with mud-plugs, would remain good an indefinite time. The preceding considerations lead to the belief that there is ample opportunity to improve the American type of passenger locomotive, and that the advent of a departure from it is not necessarily near.

The frames of American locomotives not only cause the fire-box to be very narrow, but they have the disadvantage also of not possessing sufficient vertical stiffness to enable them to stand alone. They in consequence require somewhat rigid connection with the boiler, and cause it considerable harm as it expands and contracts. The only rigid, or approximately rigid, connection between the boiler and frame should be at the smoke-box, and the boiler should simply rest on the frames between the driving-wheels. The frame then becomes the pushing and pulling part of the machine, and the boiler is carried along only for the purpose of generating steam and giving weight, and is allowed perfect freedom to choose its position on the frame. This frame can be wholly made of 1-inch or 1½-inch plate, as in England, or it can be made of plate between the driving-wheels and a bar 2 inches or 2½ inches by 8 inches or 10 inches forward of the driving-wheels, or, in fact, it might be, in the latter part, of channel or T iron. The T, or channel form, would be inconvenient, however, for the attachment of parts. Lateral stiffness can be effectively given to these thin frames by cross-bracing.

Much has been written in late years concerning the proper construction of boilers, and but little will be said here on this subject. The following are laid down, with brief argument, as general specifications of a first-class locomotive boiler: 1. Use butt joints with inside and outside covering plates, the circumferential covering plates being continuous welded hoops. 2. Punch the holes ⅛ inch small, and ream them to size when the plates are in place, or drill them in place. In either case countersink the holes slightly in order to give a fillet to the rivet head. 3. Rivet by machinery, preferably by the hydraulic system. 4. Place the screwed stays farther apart than usual, and cup their ends with a button set. 5. Use a straight boiler with a Belpaire fire-box, as this form can be perfectly stayed. 6. Incline the fire-box tube sheet toward the furnace door in order to give a wide water space, and to allow the steam to escape easily. 7. Avoid overhang in the side plates of the inside fire-box, and instead of this incline them inward, securing a large number of tubes by flanging out the side sheets forward so as to join a wide tube plate. This is important, because an overhung plate forms an ineffective evaporating surface and impedes circulation. 8. Make the ash-pan strong and as tight as possible, in order that when running without working steam it may be closed to prevent combustion, thus doing away with the necessity of opening the furnace door and allowing cold air to blow on the plates. 9. Place the tubes in rows, making 30° with a horizontal line rather than 60°, as the circulation is less impeded in the former, while nearly the same number of tubes can be got in as in the latter. 10. If the water is of good quality, take it into the boiler by a pipe passing through the end of the boiler, and run the pipe so far forward that the water will be nearly or quite as hot as the steam before it is allowed to spread about. 11. Use no dome, but rather take steam through a perforated pipe, as it is dryer than dome steam, and the boiler is less likely to prime, while domes are a source of weakness and expense.

Mr. Dean was aware that the latter condition is opposed to the settled principles of most American practice, but he believes that the matter has not received the attention which it deserves. In England and on the Continent of Europe many domeless locomotives are in use—for example, on the Great Northern Railway there are 750, on the Glasgow and Southwestern, 280, and on the Southeastern 55 per cent. of the total number are domeless, and old locomotives are being converted as rapidly as possible. It is generally assumed in this country that engines with domes work dryer steam and prime less than domeless engines; but the writer believes that these are mistakes, for, in the case of domed engines, where does steam get rid of its moisture, where does superheating take place, and is not steam in the dome further from the hottest part of the boiler than steam in the top of the boiler? And furthermore, is not steam rapidly rushing to one point more likely to entrain water than steam passing quietly through holes in a pipe which extends the whole length of the boiler, the perforations ending 3 feet from each end? The steam capacity of a dome is of no advantage, as a domeful of steam is an insufficient quantity.

In addition to the possible changes in locomotives thus far mentioned, it is desirable to direct the attention of the members of the association to some matters of smaller detail. For example, the ordinary coupling-rod, connecting-rod, cross-head and guide are not what they should be. Coupling-rods with bushed eye ends are simple, cannot be tampered with, are beautiful to look at, and have been known to run three years without renewal. The four-bar guide, which is so common, is weak, expensive and is perfectly exposed to dust. This should give way to some other form—for example to a cast-iron bored guide cast solid with the back cylinder head. This is the most perfect form of guide and cross-head yet devised, because, among other things, the cylinder head can be turned in the machine which bores the guide and at the same time, thus insuring perfect alignment. When the opposite driving-wheels are at different levels, it will allow the cross-head and piston to revolve, thus doing away with twisting the connecting-rod, wear on the edge of the guide bars, and grooving of the bars and cylinders. Moreover, it allows the upper bearing guide surface, on which nearly all the wear takes place, to be wider than the lower, and it can be boxed in and protected from the dust. In a word, it possesses very valuable features. Breakages of rock-shafts now and then occur, and the question arises whether it would not be an improvement to make them of gun iron or steel castings, larger in diameter than usual and hollow. In this way a better casting would be probable, and the metal would be better distributed, weight for weight, than in the ordinary form. Solid pistons have the advantage of simplicity and cheapness. As they are almost exclusively used in England it would seem that they would be successful here if understood.

As to the best form and material for coupling rods, Mr. Dean stated that a rod made of solid drawn weldless steel tube would possess excellent qualities for this purpose. It would be strong, light, elastic and reasonably cheap. If one of these tubes, 3½ inches in outside diameter and ½ inch thick, be passed between rolls and flattened to a thickness of 2 inches, and then welded to solid eye ends, it would make a good rod, provided the welding could be well done. This rod would have a depth of about 4⅓ inches, and if 8 feet 6 inches long, would have a factor of safety of 3¼ inches when making 300 revolutions per minute, against 4½ for the heaviest I-form used. This is rather small, but probably larger than that of many rods in use.

The Joy valve gear seems to have well fulfilled its purpose, and the opinion among men best able to judge is that it is destined to supersede the Stephenson link. The supposed hurtful effect of the rise and fall of the axle has no foundation in fact, and the performance of engines to which the gear is applied appears to be unusually good. Like all new things, its proper design is yet a problem, at least for American locomotives. The following official figures, giving the actual weights of a link motion and a Joy motion, as they were built for the same locomotive on one of our leading lines, are remarkable:

Total weight of link motion, pounds.....1,651½
Total weight of Joy motion " 828½

or almost exactly 2 to 1.

Besides the cheapness of the gear, its accessibility, accuracy, the possibility of excluding dust from the wearing surfaces, the opportunity for increasing the grate area on account of the absence of eccentrics, its capability of allowing the steam to follow the piston nearly to the end of the stroke, its rapid opening and closing of the valve, the small area of frictional surfaces and the ease of handling, are excellent features. This gear is now adopted in England by the London and Northwestern, the Midland, the Great Eastern and the Great Western railways, which are among the half-dozen most important lines in great Britain and on which the heaviest and most rapid traffic is conducted. It is also adopted by certain lines in English Colonies, and it is to be hoped that its use will rapidly spread in this country. In conclusion, the author stated that it had been his aim in this paper to draw attention to the fact that there are simple ways out of the dilemma in which master mechanics now find themselves when asked to draw heavy trains at very fast speeds, and to show that the present type of locomotive had not outlived its usefulness, as some inventors think, but was capable of considerable extensions in various desirable directions, all contributing to its cheapness, power, economy and durability.

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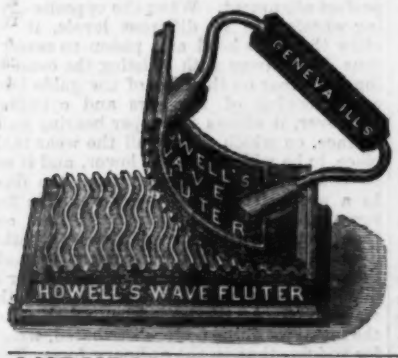

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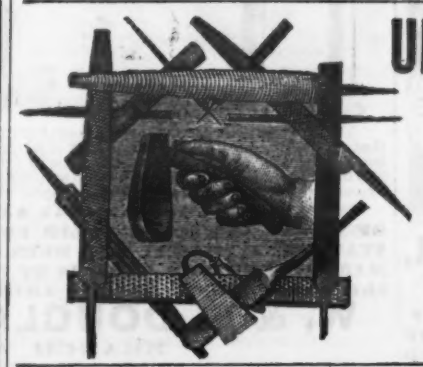

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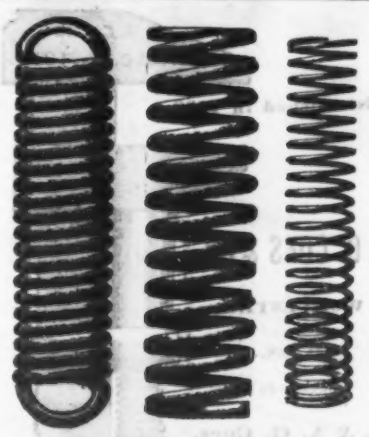

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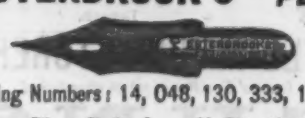

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JAPANNING, BRONZING.

collector of postage stamps lived in the reign of Louis XIV. During the seventeenth century, when the King changed the place of residence for the court, persons in his *suite* procured tickets which they stuck on letters intended for Paris, in order that they might be received and forwarded by His Majesty's carriers. M. Feuillet de Conches, a collector, possesses a letter directed to Paris on which is found a kind of postage stamp. In 1654 a regulation was issued to the effect that persons writing from one part of Paris to the other might have their letters, &c., faithfully carried and diligently delivered to any address, provided they attached to their letters a ticket indicating that its carriage was paid, as money would not be directly accepted. This ticket might be attached to or placed around the letter, or affixed in any convenient manner so that it be plainly visible. The price of this prepaid ticket was a sou. The system had been in force since August 18, 1633.

The National Exposition of Railway Appliances.

Continuing our notes of what we saw at the Railway Exposition, we follow no particular order, nor do we attempt to classify exhibits. We follow merely the order in which we happened to see them. The notes which we give are very largely those which were taken on the spot. The immense number of exhibits and their complex character will be a sufficient excuse for not entering largely into details in every case. We may, from time to time, take occasion to refer in longer articles to subjects of special interest, but for the present we shall merely attempt to enumerate some of the more interesting or more valuable things which we saw.

Messrs. Rand, McNally & Co., of Chicago, had a ticket-printing machine which for completeness seems to leave little to be desired, at least from a railroad standpoint. This machine relieves the ticket agent of all care in keeping up the stock of tickets, prevents errors in issuing two tickets instead of one, and relieves the agent entirely from the trouble of making a report, since it prints the report at the same time it prints the ticket, and, in fact, registers and prints the tickets as they are wanted in such a way as to reduce the bookkeeping of this part of the railroad work to a mere nothing. It is so complete in its numbering and dating, and furnishes such an absolute check against errors in accounting, that it strikes the business man that such a machine might be introduced to great advantage in many kinds of business besides railroading. The machine as we saw it was only about 18 inches high, and occupied a space of perhaps 12 x 14 inches on the desk.

In the exposition building several straight-line engines were at work doing electric lighting and driving wood-working machinery. One or two of them were built by the M. C. Bullock Mfg. Co., of Chicago, Ill., and the workmanship, general style of finish and perfection of running gave many an Eastern engineer a new idea in regard to the quality of work which is produced at the West. The perfection of balancing seems to have been reached in these machines. They are apparently as well able to run on a springy board or quicksand foundation as on the most solid rock. The governing of the engine is exceedingly perfect under the widest possible variation of load. At some recent tests made by Mr. Bullock, the engine's load was changed from its maximum to that due to friction in less than a stroke, but the speed indicator applied at the time showed that the greatest relative change of speed was equivalent to about one revolution per minute. As most of our readers know, this engine was designed by Professor Sweet, of Rochester, and embodies many peculiar features, among others that of transmitting the strains as far as possible in straight lines, from point to point. The engine is practically supported on three points, and is independent of any settling or motion which may take place in the foundation.

The Chicago Train Indicator Co. had a very neat device, intended to show from the rear of a train its class or number by both day or night, and designate at the same time whether or not there was a second section following it. In freight trains this is placed upon the elevated deck of the caboose.

Smith & O'Leary, 32 and 34 West Lake street, Chicago, had an exhibit which contained several very interesting features. One of these was a new patent turn-buckle of hexagonal shape and having a solid end. This turn-buckle is made of two pieces of iron, each rolled so as to form one-half of the hexagon. These are put together, hollow plugs welded in at the ends, and the turn-buckle is complete. The peculiar form given and the method of welding make it unnecessary to have a perfect weld in the sides of the buckle, the whole attention being given to securing a perfect weld between the plug and the straps. This forms not only a very strong, but an exceedingly cheap and light, buckle, which is very exact in shape and measurement, and has an exceedingly good finish. They have a very curious, but apparently very good, sliding door hanger. The railway consists of a tube having a slot on its under side. The hanger is a tongue carrying a pin, which is slid in from the end. On the pins two hemispheres are placed, which take the place of rollers. Of course, it it impossible to get the door off the track; the track itself is always dry, and apparently the construction is as perfect as could be wished for.

Fairbanks, Morse & Co., of Chicago, had a very showy exhibit. It consisted of a 20-foot windmill on its tower, a 16 by 24 50,000-gallon water-tank on 8-foot posts, a large show of steam pumps, an extensive display of scales and a very large amount of miscellaneous work. The New York and West Shore Railroad have just bought three or four of the railroad pumps and 50,000-gallon tanks for use along their road. These tanks are made in an exceedingly thorough manner, and are well hooped with hoops fastened in an improved and rather peculiar manner. The bolts of the fastening are so arranged as to draw centrally to the line of the hoop and put the strain upon the iron in such a way as to make it lie flat against the staves. These tanks, which cost about $1200, set up on 8-foot posts, would be of ample size for many of the smaller local water works. In fact, very many villages are drawing from much smaller reservoirs filled at considerable intervals. The Smith-Vaile steam pump shown by this company was a remarkably pretty piece of workmanship. The valve gear worked with exceeding smoothness, not only at a very low, but also at an exceedingly high, rate of speed, and with our limited time for observation we could not discover that the length of stroke was altered in any way by the rate of speed at which the pump ran. One of its very convenient features, especially for mining regions or places where breakages are likely to occur, is the removable pump cylinder. By taking off the back head and removing a ring which is bolted on with the head, the pump cylinder may be pulled out bodily and a new one pushed in its place in a few minutes. Set-screws on the ring beneath the head are so arranged that the adjustment may be made perfect, and when a cylinder is worn out or eaten out by acid water, a new one can be put in without disturbing the pump or making any alteration in it in the course of a few minutes. The valve is a simple D, driven from a rocker. In automatic testing machines, scales, locks, hand-carts, &c., the exhibit was exceedingly complete, and a modified form of the Fairbanks testing machine, which we illustrated in *The Iron Age*, May 3, was shown, in which there were several very decided improvements.

There were several very fine railway heaters, to which, owing to the state of the weather, very little practical attention was given by visitors. The Searle heater has several points in regard to the arrangement of pipes which deserve to be kept in mind in designing heating apparatus for cars. The hot water is taken through a straight pipe on each side of the car to the end furthest from the heater, and returned through a four-pipe radiator and then into the pipes beneath the seats to the heater. In this way a considerable advantage is obtained, on account of more equal distribution of the heat.

The pop safety-valve, of course, has a prominent part in any railway exposition. The Crosby Steam Gauge and Valve Co., of Boston, showed these valves in all their different forms. It is a fact which should be well considered by makers of ordinary safety-valves that these valves are arranged to seat on a flat surface. They rise vertically, and close across so much larger area to the steam that they are kept down until the pressure has fallen considerably below the point at which they first raised. Those who have watched their action during the last 12 or 14 years wonder whether, if they were generally introduced on stationary work, we should not have a considerable increase in safety.

The pamphlet which the National Machinery Co., of Tiffin, Ohio, distributed, is worth pretty careful attention by those who have nuts and bolts to make. This company make a large variety of machinery for the purpose, embracing almost every style from the simplest to the most complex. Their opening paragraphs in regard to the principles involved in making bolts and nuts, the use of dies, &c., are well worth consideration. Their exhibit consisted of a pretty large display of bolt cutters, headers, hot-pressed-nut machines, spike machinery, &c.

The department of car painting was very well represented, almost all of the leading manufacturers having exhibits. The Bridgeport Wood Finishing Co., of course had wood filler samples in the best possible style. Berry Bros. took the bull by the horns in a very amusing but exceedingly business fashion, which, however, puzzled the committees of jurors very much. They had a large pavilion elaborately decorated and nicely furnished, but not a pint of varnish nor square inch of paint surface did they exhibit. In reply to some questions, they said that it was impossible for any one to judge of the character of varnish, oil or paint by simple inspection; that only a trial and actual use could demonstrate the relative values, and hence they did not conceive it desirable to put their goods into the show. The unsatisfactory character of exhibits showing the qualities of varnishes was well illustrated by the firm of John Masury & Sons, whose very large and exceedingly beautiful series of panels, finished with their own colors, was considerably damaged in brilliancy by leakage from the roof and a naturally damp position. F. W. Devoe & Co.'s exhibit covered a very considerable line outside of simple colors or varnishes.

The L. B. Flanders Machine Works, Pedrick & Ayer, proprietors, 1025 Hamilton street, Philadelphia, showed a variety of their railway tools, which, as usual, were well spoken of everywhere. We had only a moment at the exhibit, and did not happen to find any one in charge, and consequently do not know if there was anything new in their line.

Car wheels, of course, were a chapter by themselves. The Ramapo Foundry had a most elegant exhibit, consisting of wheels of all sizes, from the smallest trolley up to a 42 inch passenger wheel. The castings were as fine as any we have ever seen, and the wheels were, as far as we could see, not only without flaw, but without surface blemishes. This foundry is the only one which we call to mind at the present moment which has made any considerable number of 42-inch cast-iron wheels.

The Worthington Hydraulic Works had a large and very satisfactory exhibit, which was decidedly a noticeable feature. As we have noticed elsewhere, they have just established a branch office at 95 Lake street, Chicago, which is in charge of Mr. Henry C. Johnson. One of the mechanical engineers said a very pleasant thing in regard to Worthington's pumps when looking over one of them during the excursions at Cleveland. He said it was a very high compliment to Worthington, and one which was not often given to a pump maker, that city waterworks had very frequently duplicated their orders for Workington pumps, and that a greater recommendation could hardly be asked for than this. It is a standing joke in the trade that everybody is willing to say all the bad things possible about competing neighbors, but there are many notable ex-

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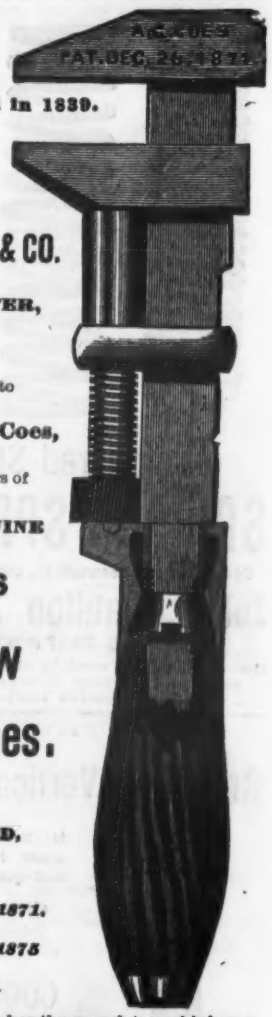

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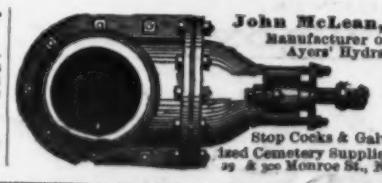

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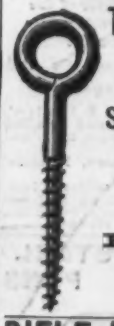

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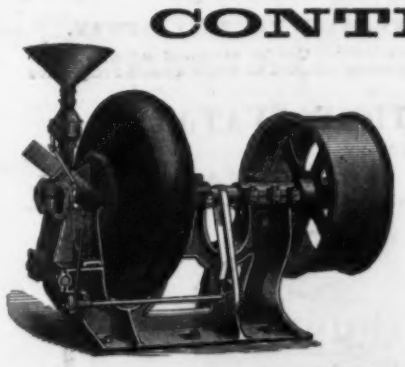

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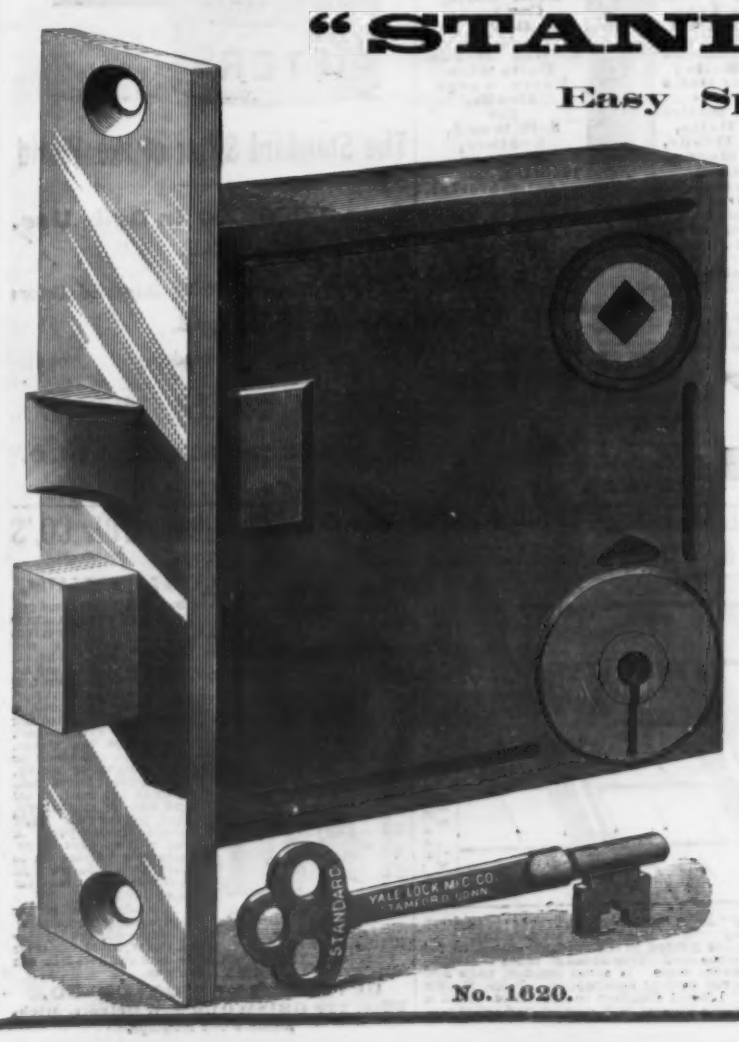

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ceptions, and Worthington's pumps seem to be one of the exceptional cases, for even rival pump makers are always willing to say a good word for them. Like their great inventor, they have been exceptional in always making friends, even among business competitors.

Courtney & Trull, 17 Dey street, New York City, had an exhibit of gelatinized fiber in a great variety of forms, both hard and flexible, for general mechanical purposes. They had it in all thicknesses, from that of a sheet of paper to a plank. Of its advantages or applications little need be said, though we note two points which had escaped our attention before. It is recommended for gibs for cross-heads, for journal bearings, especially light journals running at a high speed, and for small gear-wheels, for all of which purposes its very peculiar qualities make it well fitted.

The exhibit of the Yale & Towne Mfg. Co., Stamford, Conn., was one of the most instructive, both for railway men and the general mechanic, that was to be found in the exposition. The space occupied was not a very large one, but any one could obtain an exceedingly comprehensive lesson in the economy of handling work in the shop and in the yard. An hour spent there probably taught both mechanics and railway men a number of very notable lessons in regard to the value of different descriptions of hoisting apparatus. An enumeration of the various exhibits would be practically a list of the manufactures of the Yale & Towne Mfg. Co. Their overhead tramway for handling work was one of the little things which might have made a very good show by itself for an exhibitor who had nothing else. Four-wheel trucks traveling on this can be run in any direction, turn-tables formed and switches made of the simplest and most easily operated character. With such facilities as this particular construction offers, it seems as though there can be no excuse for want of facilities in handling work even in the most old-fashioned shops. Differential pulley-blocks, cranes of all kinds and a variety of hoisting tackle completed this department of the exhibit.

One of the most interesting things, however, was the exhibit, under the title of the Emery Scale Co., of the Emery testing machines, pressure gauges and scales. These, as some of our readers know, are similar in their weighing details to the weighing apparatus of the Watertown testing machine. The accuracy and range of that machine are now matters of history, and the transition from weighing hundreds of tons to the testing of a human hair seems to be made with perfect facility.

The Westinghouse Machine Co. had a large and showy exhibit and several new engines, notably a large one with their latest style of valve gear, in which the valve-stem stands at right angles to the line of the piston, and is worked by a bell crank attached to the eccentric-rod on the outside of the engine-frame.

The general public is not greatly interested in the question of checks, the check system externally working as near perfection as anything human can. From the railway side, however, there are inconveniences, and one of the latest improvements which was illustrated at Chicago was Thomas Abbott's universal check, which seemed, with a single set, to provide for all the contingencies of a complicated railway system.

Philip S. Justice & Co., 14 North Fifth street, Philadelphia, had an exhibit of dead-stroke hammers, showing them in all their different varieties, and also of the drawn steel tubes for which they are agents. This exhibit was exceedingly fine, and many regrets were expressed that these tubes are not in the market in a little more convenient fashion.

Mr. E. P. Bullard, 14 Dey street, New York, had a large and interesting exhibit, comprising a variety of tools, lathes, planers, milling machines, &c. Many of our readers may not know that Mr. Bullard is the New York agent for the Brown & Sharpe Co., and they announce in their last catalogue that they have a full line of samples at his place. There was a 16-inch x 8-foot Bridgeport lathe and a 16-inch x 12-foot, and also a 20-inch x 8-foot bed and a 20-inch x 8-foot bolt lathe. There were, besides these tools of his own make, several of Brown & Sharpe's milling machines, besides a screw machine, grinding machine and a Gray screw machine. The 16 x 16 x 42 inch planer had several very neat points about it. Mr. Bullard distributed from the stand a little catalogue, which he has just issued, of his goods. The greater portion of it, however, is devoted to a very neat and well-illustrated history and description of the East River Bridge. The catalogue itself contains a list of the principal tools manufactured by the Bridgeport Machine Tool Works, and is neatly gotten up and has ample and well-written descriptions of the different tools. One feature of most of the tools that we have examined was very great strength and stability, and those which we saw at work were taking very heavy cuts, apparently with as much ease as the lighter ones, a feature which, in these days, when tools are driven hard and the utmost is expected, is exceedingly valuable. Among the miscellaneous exhibits, and one which has attracted a good deal of attention among railroad men, was the Congdon brake shoe. Its remarkable hold and small wear have made this a favorite. As we remember the figures, its wear is about 5 to 1½ of the ordinary shoe.

In the wood-working machinery the A. J. Fay & Co. exhibit, Cincinnati, Ohio, was by far the largest and most attractive. The machinery was, of course, all designed for car-work, and some of it was exceptionally heavy and complete. One timber-dressing machine was capable of handling a stick 14 x 16 inches.

Almost every one connected with railroads has heard something in regard to the Dudley dynagraph car, made by P. H. Dudley, New York. This is probably the most complete and ingenious apparatus of the kind which has ever been constructed, and the number of facts which it automatically records is almost incredible to those who are unacquainted with its working. The Paige Car-Wheel Co., of Cleveland, had an interesting exhibit of a car-wheel in which the hub and tire were connected by a pair of metal plates ½ inch thick, forced into the tire and on to the hub at the same time by hydraulic pressure. These wheels are designed to give as great an amount of elasticity to the tire as is consistent with safety. They are made in all sizes, from 28 to 42 inches.

The Niles Tool Works, Hamilton, Ohio, of whose exhibit we have made some mention in connection with the Morgan Engineering Works, Alliance, Ohio, distributed from their stand a catalogue of some of their more important tools. A considerable number of the illustrations in this catalogue have already appeared in our columns, together with a portion of the reading matter. The tools are most of them special, and all of them of great size and power.

The E. Horton & Sons Co., Windsor Locks, Conn., had a complete line of the Horton lathe and chucks on exhibition. The goods are almost too well known to go into particulars, or even to make necessary a notice of their finely-illustrated descriptive catalogue of the chucks, which shows the construction as well as the internal appearance of them.

The Adams & Westlake Mfg. Co.'s Chicago exhibit was, of course, an interesting as well as a beautiful one. Elegant lamps and lanterns of all styles and varieties, from the hand lanterns for the conductor to the monster headlight of a locomotive, were shown to the best advantage, and we noticed on one of these locomotive headlights an arrangement at the corner by which the number of the engine was shown in bright letters on a red ground. This little attachment will doubtless be a great convenience, as it enables an engine to be recognized in the night time as easily as in the daylight.

The French Spiral Spring Co., Pittsburgh, Pa., issued a very beautiful catalogue, containing engravings of almost every style of spring which they manufacture, from the lightest to the heaviest. Some of their new pattern springs are very material improvements on what has gone before them, and it would seem that the cars mounted upon them must certainly ride far easier under varying conditions of load than on the old style of spring.

Carey, Ogden & Parker, Chicago, Ill., had an exhibit of paints and paint samples, which was not only attractive, but interesting. A sample of red mixed paint was shown, which was exceedingly fine, and the way in which they were put up was very convenient. We were especially interested in certain lines of red mixed paints put up in very small packages for the retail trade, which fills a want long felt.

The Fuller electrical headlight is intended for use on river steamboats, and is, as its name indicates, a headlight in which the illumination is furnished by an electric light placed in the focus of an ordinary headlight mirror. The company first provided a suitable arc light, and then designed a reflector, lantern, &c., for it. An electric light of this kind from a powerful reflector seems to have a very wide range of use, and probably could be employed for very many purposes to better advantage than a naked arc light.

The Rocking Grate Bar Co., of Chicago, had an exhibit which was doing in its way some very remarkable things. Each bar is made up of a number of pieces sitting on a lower bar, and so pivoted that the whole can be swung backward and forward at the will of the operator, and perfectly clean a fire, even of the most obstinate kind, without the use of a slice or any of the usual fire tools. For burning slag, the poorer classes of bituminous coals, and, in fact, for almost any kind of fuel, it seems to have proved itself exceedingly desirable.

TRADE PUBLICATIONS.

Saylor's Portland Cement.

Messrs. Johnson & Wilson, general sales agents for Saylor's American Portland cement, with office at 91 Liberty street, New York, have issued a neat pamphlet descriptive of the merits of this article. A very striking title in red, blue and black, embracing the trade-mark of the company, appears on the first page of the cover. Illustrations within the pamphlet are views of the works of the establishment and the packing warehouse. Then follows a brief essay on cement, with statistics of the amount entered yearly at the port of New York since 1877. Directions for use and mixing for sidewalks, cellar floors, stable floors, and other purposes, together with a list of work for which Portland cement is best adapted, succeed this. Then is inserted extracts from the history of the jetties at the mouth of the Mississippi River, by E. L. Corthell, published in 1880. This contains an illustration showing a birdseye view of the Port Eads jetties, with the requirements of cement work adapted to that purpose. Then follow tests which were made showing that Saylor's Portland cement gave satisfactory results. The balance of the pamphlet is largely devoted to testimonials from those who have employed the cement in large quantities, among which may be mentioned a letter from Mr. C. C. Martin, First Assistant Engineer of the New York and Brooklyn Bridge; Mr. D. C. Haskins, of the Hudson Tunnel and Construction Co.; Q. A. Gilmore of the United States Engineers, and Frederick Law Olmstead, landscape architect, United States Capitol. Following these are extracts from notes and experiments on the use and testing of Portland cement by Mr. William Maclay, member of the American Institute of Civil Engineers. Following these, extracts of still further testimonials are inserted. Altogether the pamphlets contains a large amount of information which is of importance to architects and engineers generally, as well as authentic testimonials which must go far toward indicating to any unprejudiced person the actual merit of the goods advertised.

Flanders Machine Works.

Messrs. Pedrick & Ayer, proprietors of the Flanders Machine Works, Philadelphia, have issued a neat pamphlet, directing attention to their labor-saving devices, and containing numerous testimonials from those who have employed the specialties produced by this concern. Unlike many testimonials that are often printed, these are *fac similes* of the originals, being done by photo-lithography. Accordingly, the pages of the pamphlet have many attractive features not possessed by ordinary trade publications. In

H. D. SMITH & CO.,

Plantsville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE,

Manufacture the Largest Variety of Forge Carriage Irons, of Best Material and Workmanship.

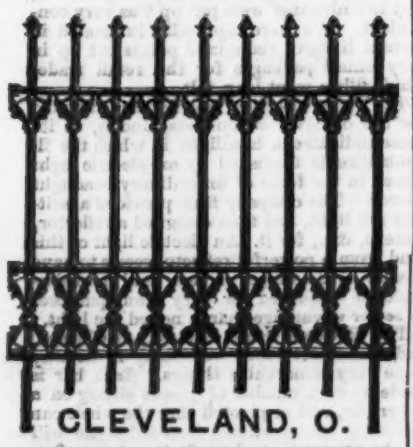
PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

VAN DORN IRON WORKS,

SOLE MANUFACTURERS OF THE

Cleveland Wrought Iron Fence,



CLEVELAND, O.

The best and cheapest Fence manufactured. Over 1,000,000 feet now in use. Send for catalogue and estimates.

(Please mention this paper.)

The Curtis Steam Trap.

Has automatic air discharge; has a differential opening, thus discharging all the water as fast as it comes. Is very accessible for cleaning, the valve being on the outside. Send for circular. Manufactured by the

CURTIS REGULATOR CO.,
61 Beverly St., BOSTON, MASS.

GENERAL AGENCIES: 109 Liberty St., N. Y.; 925 Market St., Phila., Pa.; 80 Market St., Chicago, Ill. and Cor. Halliday and Saratoga Sts., Baltimore, Md.

COBB & DREW

Plymouth, Mass.,

Manufacturers of Copper, Brass and Iron Rivets; Common and Swedes Iron, Leathered, Carpet, Lace and Gimp Tacks; Finishing, Hungarian, Trunk, Clout and Cigar Box Nails, &c. Rivets made to order.

NEW YORK AGENCY,

GRUNDY & DISOSWAY,
HARDWARE,
165 GREENWICH STREET,
Agents for the Philadelphia Star Carriage and Tire Bolts.

ROMER & CO. Manufacturers of Patent Jail Padlocks, Brass and Iron Padlocks, Carriage Lamps and Lanterns, 28 to 42 Summer Avenue, Newark, N. J. Illustrated catalogues sent to the trade on application.

HOW TO KEEP **BOILERS** CLEAN

FREE Book Sent To Any Address By JAS. F. HOTCHKISS, 84 John St. N.Y.

MINERS' CANDLES.

Superior to any other Light for Mining Purposes. Manufactured by

JAMES BOYD'S SON,
Nos. 10 & 12 Franklin St., New York.

SARANAC HORSE NAIL CO.,

PLATTSBURGH, N. Y.

A. WILLIAMS, Pres't and Treas. S. F. VILAS, Vice-Prest. W. S. GUIBORD, Sec'y.

The cuts illustrating this advertisement are of Nails twisted and bent when cold, and are manufactured from best brands Swedish Iron.

FOR SALE WITH

Sligo Iron Stone Co., Simmons Hardware Co., Careth & Byrnes Hardware Co., St. Louis Hardware Co. and Witte Hardware Co., of St. Louis.

Ely & Williams, Philadelphia and New York.

S. H. & E. Y. Moore, Hibbard, Spencer, Bartlett & Co., Edwin Hunt's Sons, Chicago.

S. G. B. Cook & Co., Baltimore.

Eureka Patent Shear

For Cutting Round and Flat Bar Iron and Sheet Metal.

MADE ENTIRELY OF CAST STEEL.

Cheapest and best tool for the purpose ever put on the market.

Send for Descriptive Circular.

EUREKA SHEAR CO.,
811 Market St., Philadelphia, Pa.

THE LEFFEL
IMPROVED DOUBLE TURBINE
WATER WHEEL.

More of these Turbines are in constant and satisfactory use, under a greater variety of conditions and situations, than any kind of Turbine ever made. Therefore, the purchaser of one of these Water Wheels will make no costly experiment, but get a Turbine of established reputation, that has been more thoroughly tried than any turbine ever constructed. For practical information and free illustrated catalogue, address,

JAMES LEFFEL & CO.,
SPRINGFIELD, OHIO,
Or 110 Liberty St., NEW YORK.

J. STEVENS & CO.,

Chicopee Fal's, Mass., P. O. Box 224,

MANUFACTURERS OF

SPRING CALIPERS & DIVIDERS.

Also, Surface Gauges and Counter Sinks, Stevens' Patent Breech Loading Sporting Rifles, double and single barrel; Shot Guns, Pocket Rifles, Pocket Pistols, and the noted Hunters' Pet Rifles. Our

SHOOTING GALLERY RIFLE

is the favorite everywhere.

SEND FOR ILLUSTRATED CATALOGUE AND DISCOUNT.

NEW HAVEN HORSE NAIL CO

We Guarantee All Nails Superior in Quality.

TRADE NH MARK

Perfect in Driving Unexcelled in Finish.

FORGED POINTED FINISHED

FOR SALE BY
ELY & WILLIAMS, 178½ Water Street, New York.
RUNYON & HALLETT, 103 Chambers St., New York.

PATENT AUTOMATIC STOP

ELEVATORS

AND

DUMB WAITERS,

HYDRAULIC OR STEAM POWER.

SPEED, 50 TO 500 FEET PER MINUTE, WITH PERFECT SAFETY.

The fastest Belt Machine in the Market running noiselessly. Can be stopped at any floor with certainty without an attendant. Especially adapted to high speed Freight and Package business. Address

TEWKSBURY AUTOMATIC ELEVATOR CO.,
OFFICE AND FACTORY,
275, 277 & 279 Passaic St., NEWARK, N. J.

PAWTUCKET MFG. CO.,

PAWTUCKET, R. I.,

MANUFACTURERS OF

ALL KINDS OF BOLTS

For Cotton, Woolen, Silk and other Textile Machinery such as Loom Bolts, Frame or Joint Bolts; also Boiler Bolts with Pilot Points, Boiler Patch Bolts, Round Heads, Square Heads, Hexagon Heads, Countersunk Heads, both Square and Round, Elevator Bolts for fastening Metal Buckets to Leather or Rubber

Bolts, Deck Bolts, Car Seat Bolts, with Slotted Heads. Bolts with Extra Large Heads, for Soft Wood, Leather, or other yielding material, a specialty.

☞ Send for Samples.

All kinds of Cold Punching at Short Notice.

Elevator Bolts of All Kinds.

Samples Cheerfully Furnished.

The Standard Sifter of the World

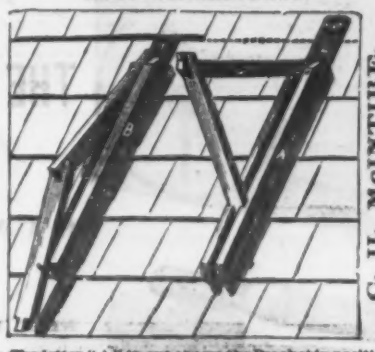
Over 3,000,000 In Daily Use.

Every Sifter carefully inspected before being packed and shipped.

Special price to the trade.

HUNTER SIFTER MFG. CO.,
34 to 40 E. 5th St. Cincinnati, O.
400 Canal St., New York City.

CADWELL'S PATENT ADJUSTABLE ROOFING BRACKET.



The letter "A" in cut shows the Bracket in position for shingling; "B" folded ready for packing. "C" is an iron plate riveted to the Bracket, with slots for fastening to the roof. This Bracket takes a shingling board 14 inches wide. It saves lumber, nails and time, and gives perfect satisfaction. Price, $6.00 per dozen. Liberal discount to the trade. Send 50 cents for sample Bracket, with circular and references, for a trial.

C. H. McINTIRE,
P. O. Box 300. Reading, Mass.

THE DETROIT LUBRICATOR CO.'S

SIGHT-FEED

LUBRICATOR CUPS,

First Prize at Fair American Institute and Millers' Intern'l Exposi'n, Cincinnati, etc.

for oiling valves and cylinders of steam engines by the only perfect method, through the steam pipe. The oil passes in sight, drop by drop, into the column of steam, where it vaporizes, thus becoming a steam lubricant, oiling perfectly every part reached by the steam. Any clean oil, black or white, light or heavy, may be used. Saves from 25 to 50 per cent. in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on 30 days' trial if desired. In ordering, give diameter of cylinder.

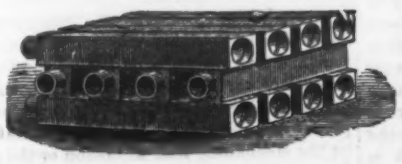
Note.—In our recent suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews, of the U. S. Supreme Court, involving their "sight feed" feature, a decree was rendered in our favor August 20, 1881. Address,

DETROIT LUBRICATOR CO.
Office, 129 GRISWOLD ST., Detroit, Mich.

Mention *The Iron Age.*

FRANKLIN S. MILES,
Manufacturer of
Brass, Iron, Steel and German Silver
SCREWS,
205 Quarry Street, Philadelphia.

A. WYCKOFF,
Manufacturer of



CHAIN PUMP TUBE

Special prices to the wholesale trade for the next 30 days.

122 Railroad Avenue, ELMIRA, N. Y.

R. COOK & SONS,
Manufacturers of
Carriage & Wagon AXLES,
WINSTED, CONN.
ESTABLISHED - - - - 1839.

N. Y. MALLET and HANDLE WORKS

Manufacturers of
Calkers', Carpenters', Stone Cutters', Tin, Copper and Boiler Makers'
MALLETS,
Hawsing Beetles, Hawsing and Calking Irons; also all kinds of Handles, Sledge, Chisel and Hammer Handles, Also
COTTON AND BALE HOOKS,
Patented Feb. 11, 1879; a new combination of Hooks.
436 E. Houston St. New York City.

158 CHAMBERS ST. NEW YORK CITY
F. R. Emmons & Bro.
TACKS
E. PHILLIPS & SONS, Manufacturers, SO. HANOVER, MASS.

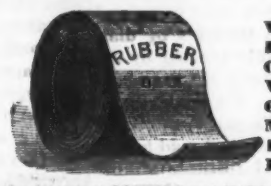
WHIPPLE MFG. CO.,
Cleveland, O.
—o—
FINE BRONZE and BRASS CASTINGS to order.
ALSO
LIGHT GRAY IRON CASTINGS OF SUPERIOR QUALITY.

WALDRON & SPROUT.
Manufacturers of
Sprout's Double and Single Shear
Horse Hay Forks
And
Sprout's
HAY ELEVATORS, PULLEYS and GRAPPLES.
Send for Circulars.
Muncy, Lycoming Co., Pa.

KEYSTONE SCREW CO.,
17th and Venango Sts., Philadelphia.
J. BILLERBECK,
Manufacturer of
IRON
Gimlet-Pointed Wood Screws.
WRITE FOR DISCOUNTS.

Vulcanized Rubber Fabrics
ADAPTED TO
MECHANICAL PURPOSES.
RUBBER BELTING and PACKING.

Machine Belting,
Steam Packing,
Leading Hose,
Suction Hose,
Grain Elevators,
Steam Hose,
Piston Rod Packing,
Gaskets and Rings,



Vacuum Pump Valves,
Ball Valves,
Car Springs,
Wagon Springs,
Gas Tubing,
Machine Belting,
Billiard Cushions,
Emery Wheels.

This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than Twelve Years, also those for Armor, Dole & Co., of Chicago, Vanderbilt's Elevators for the N. Y. Central & Hudson River R. R., the great Elevators of the Penna. and Erie Railroads, of Jersey City and Hoboken, Dow's Stores, of Brooklyn, and many others; in fact, the largest Belts for the largest Elevators in the world.
A single carrier belt in the Penna. R. R. Elevator is over 800 feet long, weighing 18,000 pounds, and has run perfectly from the start.

LINEN and COTTON HOSE.
Plain and Rubber Lined,

Pat. 6/45.

Pat. July, 1873.

Circular Woven Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbolized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c

"TEST" HOSE. "CABLE" ANTISEPTIC.

Emery Wheels and Packing.
ORIGINAL
Solid Vulcanite
EMERY WHEELS

Patented.

Emery Wheel.

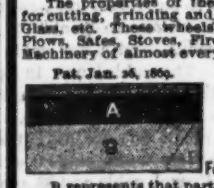
Patented.

Section of Emery Wheel showing Iron Center.

LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

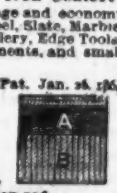
The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Safes, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.

Pat. Jan. 26, 1869.



PATENT ELASTIC
Rubber Back Square Packing,
BEST IN THE WORLD.
For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps.

Pat. Jan. 26, 1869.



B represents that part of the packing which, when in use, is in contact with the piston rod. A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction.
This Packing is made in lengths of about 20 feet, and of all sizes from ¼ to 2 inches square.

Corrugated Rubber Mats and Matting,

Pat. 11,208, 273,601

Pat. July, 1879.

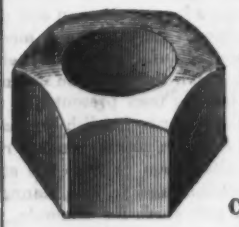
For Halls, Flooring, Stone and Iron Stairways, &c.

This practical and indispensable article—especially for wear where exposed to ice, snow or slush—was first introduced by this company several years ago, and its real value is in being almost indestructible, when proper materials are used in its manufacture, whilst the cheap, inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address

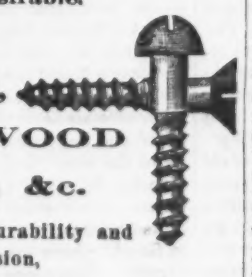
NEW YORK BELTING & PACKING CO.,
Warehouse, 13 & 15 Park Row (Opposite Astor House), New York.
JOHN H. OHEEVER, Treasurer.

BUCK BROTHERS, Millbury, Mass.
The most complete assortment in the U. S. of
Shank, Socket Firmer and Socket Framing Chisels.
PLANE IRONS.
CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons, who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark also "Riverdin Works."

PHOSPHOR-BRONZE
FOR
BEARINGS, SLIDE VALVES, CYLINDER RINGS,
CROSS-HEAD GIBBS, STEPS, BUSHINGS,
And all purposes where Maximum Durability, Anti-Frictional and Non-Cutting Qualities are Desirable.



PUMP RODS,
BOLTS & NUTS,
MACHINE and WOOD
SCREWS, &c., &c.



Combine Toughness, Strength, Durability and Resistance to Corrosion,

TRADE MARKS.

"Phosphor-Bronze."

CASTINGS OF ALL KINDS TO ORDER.
SEND FOR PAMPHLET AND PRICES.
THE PHOSPHOR-BRONZE SMELTING CO., LIMITED,
No. 512 Arch St., PHILADELPHIA, PA.
Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the United States.

addition to those which are in *fac simile*, a number of very important testimonials are printed, and following is a list of general references. The success of this establishment in producing labor-saving devices, useful about railroad, locomotive and machine shops in general, is well known. The list of manufactures of this concern embrace steam and blast cylinders, hydraulic and steam hoists, pumps, steam hammers and general machine work.

The Denver Exposition.

We have just been favored with a programme of the second annual exhibition at Denver, Col. It is in the shape of a catalogue, 6 by 9 inches in size, and embracing 28 pages, giving all necessary information for intending exhibitors. A full description of the exposition buildings is submitted, together with particulars as to railroad and express rates, hotel accommodations, &c. A set of rules and regulations and a classification of the exhibits occupy the last four pages of the catalogue.

How to Make Photographs.

This little pamphlet, issued by the Scovil Manufacturing Co., 419 Broome street, New York, contains a great deal of matter which the amateur will find valuable. There are eight pages devoted to the subject of proper making of pictures. The remainder of the space, some 40 pages, is devoted to lists of lenses, different styles of dry plates, apparatus of various kinds, and, what will be found very useful, a series of directions for the use of different kinds of dry plates to be found in the market. These include formulæ for the Special, Nordens, Beebe, Carbutts, Crystal, Monroe and Cramer's. These formulæ, together with the prices of apparatus and list of chemicals, are quite as interesting to the amateur as the directions usually found in beginners' instruction books. The only drawback to them is that some of the makers are apparently more ignorant of chemistry than they are of practical plate making, and occasionally introduce directions into their formulæ which a little more knowledge of chemistry and the reactions of chemicals on each other would certainly lead them to omit.

LATEST LEGAL DECISIONS.

CORPORATIONS—DEBT—ADMISSIONS OF OFFICERS.

In an action against a receiver of a corporation the claim was disputed, and the controversy turned on the sufficiency of the evidence to prove the claim. In this case—Webb *vs.* Smith—the plaintiff recovered, and the defendant carried the case to the Supreme Court of Colorado, where the judgment was affirmed. The judge on the trial allowed the plaintiff to testify that before the receiver entered upon his duties the secretary and superintendent of the company acknowledged that his bill was correct when he presented it, and he was permitted to state that the president of the company told him in the City of New York that he would "see the bill paid," the company being short of funds then. Judge Helm, in the opinion, said: "The company, being a corporation, could contract debts, audit accounts therefor, and pay the same, only by its agents. Under the circumstances disclosed by the record in this case, we conclude that the superintendent and secretary were its general agents in the transaction of its business, and that they were clothed with all the powers essential to the successful management thereof. The declarations objected to had reference to a past transaction; they were admissions of a debt previously contracted; they were not admissible as part of the *res gestæ*, and they could not bind the company in estoppel. But being made by its general agents and representatives concerning an indebtedness clearly within their power to contract and pay, they were admissible under an exception to the rule excluding the declaration of an agent made subsequent to the transaction to which they relate. These declarations were, however, proof only *prima facie* against the company; their entire effect might have been destroyed by corrections or by explanations showing ignorance, mistake or want of authority in the premises."

TRADE-MARK—DESCRIPTIVE NAME.

A motion for a preliminary injunction to restrain the use of a trade-mark was denied in Hostetter *vs.* Fries, in the United States Circuit Court for the Southern District of New York, the bill of complaint and the affidavits not showing a sufficient case. Judge Wallace, in the opinion, said: "Complainant's property consists in the right to use the name 'Dr. J. Hostetter's Stomach Bitters' in connection with certain labels, bottles and other devices, which designate the preparation as of their own manufacture, and indicate its origin. The bill alleges that the defendants are engaged in manufacturing and selling certain essences, oils and extracts, which they represent can be so manipulated and used as to produce a good imitation of various well-known brands of bitters, among them an imitation of Hostetter's Bitters; that they sell the same to compounders and jobbers, with instructions to the purchaser as to the mode of compounding the bitters and selling them as the genuine article, and that such purchasers compound the same and sell the bitters made thereby to retail dealers, and the latter procure the empty round-head bottles which have been sold by the complainant, having the labels thereon, and refill them with the bitters compounded from the defendant's essences, and put them off upon the public as the genuine bitters of the complainant's manufacture. The complainant has neither the exclusive right to make bitters compounded after the formula of Dr. Hostetter, nor the exclusive right to sell bitters by the name of Hostetter's Bitters. The preparation never had any name until it was offered to the public and christened. When a new article is made a name must be given to it, and this name becomes, by common acceptation, the appropriate descriptive term by which it is known, and therefore becomes public property. If this were not so, any person could acquire the exclusive right to a formula by giving a name to the compound produced, not only when the compound has not been patented, but when it might not be the subject of a patent. All who have the right to manufacture and sell the preparation have the right to designate and sell it by the name by which alone it is known, provided care is observed to sell the preparation as the manufacturer of the same, and not the preparation made by another. A 'trade-mark' consists of a word, mark or device adopted by a manufacturer or vender to distinguish his production from other productions of the same article. A name alone is not a trade-mark when it is understood to signify not the particular manufacture of a certain proprietor, but the kind or description of the thing which is manufactured."

SALES—WARRANTY OF QUALITY.

Certain goods, on being offered for sale, were represented as "good bagging and gunnies, and far superior to any Chicago or Milwaukee packings." The purchasers refused to pay for these goods unless there was an allowance of $200, for they were of an inferior quality, and when suit was brought they set up a counter claim for that amount and recovered upon it. The plaintiffs carried the case—Winkler *vs.* Potter—to the Supreme Court of Wisconsin, where the judgment was affirmed. Judge Cole, in the opinion, said: "There can be no doubt that this representation amounted to a warranty of the quality of the merchandise upon which the defendants had the right to rely. It is not questioned that the warranty applied to the first carload sent, but it is disputed that the second carload was sent under it. But all the goods were sent on the same order, and the warranty is coextensive with the contract."

FRAUDULENT SALE—WHO ARE CREDITORS.

Merchants who were embarrassed, and who shortly after the sale of their entire stock of goods to D took voluntary proceedings in bankruptcy, were allowed to remain in ostensible possession of the goods. In an action by a creditor against the merchants he did not show the date of his claim, and on the case being carried, in error—Dinsmore *vs.* Tomer—to the Supreme Court of Nebraska, the plaintiff having succeeded below, the point was made that as the claim might have arisen after the transfer of the property, when the title had passed out of the defendants, the judgment could not stand. It appeared on trial that the purchaser of the stock knew of the pecuniary distress of these merchants. The Chief Justice (Lake), in affirming the judgment, said: "The statute protecting creditors against fraudulent transfers of property declares that creditors shall include 'persons who shall be creditors of the vender or assignor at any time while the goods and chattels shall remain in his possession or under his control.' This part of the statute is conclusive against the defendant. But even without it we could not hold as requested, for, independently of it, the rule under like statutes and under the common law seems to be firmly settled the other way. Subsequent creditors are protected by this rule against fraudulent sales, as well as those having claims at the date of the fraudulent conveyance."

MASTER AND SERVANT—RISKS TAKEN BY EMPLOYEE.

The wife of an employee who was killed through the negligence of his employer, as administratrix sued for damages, and recovered a judgment. The defendant appealed the case—Parkhurst *vs.* Johnson—to the Supreme Court of Michigan, where the plaintiff also succeeded. It appeared on the trial that in taking burned stone out of a lime kiln there were some necessary precautions to be taken by the workmen to avoid danger, and that J, who had employed P, though working with him and avoiding danger himself, had not advised him of the risk, he being a common laborer, and but little informed in lime burning. Judge Cooley, in the opinion, said: "We agree with the circuit judge that there was some negligence on the part of J. He took an inexperienced man into a place of danger without apprising him of the risks, and without any warning that danger was to to be anticipated. It is true the workmen in the business testify that they do not consider it dangerous, and probably it is not to one who fully understands it, but this man did not, and he lost his life in consequence. The negligence consisted mainly in not informing him.

BOUNDARIES OF NAVIGABLE RIVERS.

The owner of lands on the Des Moines River claimed that his boundary line ran to the middle of the stream, and, in a suit over it, was beaten. He appealed to the Supreme Court of Iowa, where he was again defeated. The defendant, a railroad company, had operated their road over the disputed land since 1859. Up to 1865 the Des Moines River was, in law, a navigable stream, and in that year Congress had declared it to be non-navigable. On this declaration the former riparian owner claimed that his line was extended to the center of the river. Judge Adams, in the opinion in the case—Wood *vs.* Chicago, Rock Island and Pacific R. R. Co.—said: "There is no principle of action in this case. The claim of an extension of boundary as an incident to the act of Congress declaring the stream non-navigable is not tenable. We have been unable to discover any authority or principle upon which we could hold that the act had that effect. The case is somewhat like that of the vacation of a street. The boundary of the land abutting on the street is not changed. While a stream is navigable the rights of the riparian owner are subject to the right of navigation; after it is declared non-navigable they are not, and he is no further benefited."

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The Iron Age

AND

Metallurgical Review.

New York, Thursday, July 12, 1883.

DAVID WILLIAMS, - *Publisher and Proprietor.*
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CONTENTS.

First Page.—British Rail Exports. The Mallet System of Controlled Combustion.

Third Page.—The Mallet System of Controlled Combustion (Concluded). The Steel Cruisers. Revival of Railroad Building in Dakota.

Fifth Page.—Improvements in Locomotives.

Seventh Page.—Improvements in Locomotives (Concluded).

Ninth Page.—The National Exposition of Railway Appliances.

Eleventh Page.—The National Exposition of Railway Appliances (Concluded). Trade Publications.

Thirteenth Page.—Latest Legal Decisions.

Fourteenth Page.—Railroads as Iron Manufacturers. Gaseous Fuel in Iron Manufacture. Opening Corea to American Commerce. The New Ocean Cables. German Views of the Iron Situation. National Mechanical Expositions.

Fifteenth Page.—National Mechanical Expositions (Concluded). Hotels for Factory People. The Cleveland Meeting of the Mechanical Engineers—The Schedule of Bar Iron Extras.

Seventeenth Page.—The Cleveland Meeting of the Mechanical Engineers (Continued).

Nineteenth Page.—The Cleveland Meeting of the Mechanical Engineers (Concluded). On Standard Cast-Iron Fittings. Metallurgical Notes. The Pittsburgh Exposition.

Twenty-first Page.—Trade Report—British Iron and Metal Markets. Trade and Finance. General Hardware.

Twenty-second Page.—General Hardware (Concluded). Iron. New York Metal Exchange. Metals. Foreign Trade Movements. Old Metals, Paper Stock, &c. Imports. Exports. Coal.

Twenty-third Page.—Philadelphia. Pittsburgh. Chicago. Chattanooga. Louisville. Cincinnati. St. Louis. Richmond. Baltimore. Our English Letter.

Twenty-fourth Page.—Our English Letter (Concluded). Foreign.

Twenty-sixth Page.—Steel Castings in Ship and Marine Engine Construction. Gaseous Fue in the Manufacture of Iron.

Twenty-eighth Page.—Gaseous Fuel in the Manufacture of Iron (Concluded). Mr. Reese and the Bessemer Steel Co. A New Radial Drill. Scientific and Technical. The Steel Wire Rod Industry. New York's Great Growth. The Comstock Lode.

Thirtieth Page.—Industrial Items. Extended Smoke-Boxes in Locomotives. Lighting the Suez Canal.

Thirty-first Page.—*The Iron Age* Directory.

Thirty-fourth Page.—New York Wholesale Prices.

Thirty-fifth Page.—New York Wholesale Prices (Continued).

Thirty-sixth Page.—New York Wholesale Prices (Concluded).

Forty-first Page.—Philadelphia and Pittsburgh Hardware and Metal Prices.

Forty-second Page.—Boston Hardware and Metal Prices.

Railroads as Iron Manufacturers.

The railroads of this country do not usually manufacture their own iron, although they annually use more iron and steel than all other classes of consumers put together. This is the more remarkable when the fact is taken into consideration that railroad managers of every degree have a decided tendency toward manufacturing their own supplies. Small railroads have repair shops in which damaged locomotives are doctored and worn-out cars are renovated, with an occasional effort at the construction of an out-and-out new car. Larger roads develop the manufacturing propensities further, and invest in huge machine shops, car shops and foundries, in which they not only do all the repairing they need, but also build most of their rolling stock, including ponderous locomotives and magnificent passenger cars, as well as the less imposing, but equally necessary, freight cars. Their shops turn out large forgings, and their foundries furnish all sorts of castings, including car-wheels. Many of our leading railroad companies have manufacturing establishments of this character which are the admiration of the mechanical world, and which require for their management the highest scientific and technical skill, and which are so extensive that they alone build up and support large cities. The location of a great railroad's repair shops in a town is hailed as a glorious boon, while their removal from a city is mourned as an unending calamity. So jealous were manufacturers of their rights, and so watchful were they of encroachments, that when some of the earliest charters were granted to railroad companies in this country, a proviso was usually inserted in the charters forbidding the companies from engaging in manufacturing, permitting them only to make repairs. It was foreseen that railroads would require a great deal of mechanical work, and it was feared that if they were given full liberty to make anything they needed, they would in time absorb and monopolize most lines of manufacture. But the proviso failed to restrain the companies within the intended limits. The word "repairs" was found to be capable of almost indefinite stretching. One important railroad company which was thus restricted had most of its locomotives built upon its own models in its own machine shops, in defiance of its charter, but it used a few old bolts and screws in the work of construction in order to keep up the fiction of "repairs." Little effort is now made, however, to restrict the railroad companies to the business of carriers by rail exclusively, but, on the contrary, there seems to be no limit to their privileges. They mine and sell coal, operate canals, manage inland and ocean steamers, run hotel and summer resorts, control cabs and carriages, build bridges, construct locomotives and cars, and to some extent manufacture iron and steel. We will briefly mention the companies which own rolling mills and blast furnaces.

Years ago, in 1868, the Philadelphia and Reading Railroad Co. built an iron-rail mill at Reading, Pa., and so good was the quality of the rails made there that the company refused to lay any other rails in its tracks until quite recently, when steel rails could be purchased cheaper than iron ones could be made. The company subsequently became interested in a number of other iron works along its lines, and was obliged to purchase several blast furnaces and rolling mills to secure its investments, and it is to-day one of the leading owners of iron properties in the country. Its works are located at various points in the Schuylkill Valley, Pa.; at Danville, Pa., and at Richmond, Va. In 1870 the Baltimore and Ohio Railroad Co. followed the example of the Philadelphia and Reading, in erecting an iron-rail mill, which it located at Cumberland, Md., but, though it turned out rails of good quality, the company soon after preferred to use steel rails, and in recent years the mill has been used for the purpose of making plates, bars and other forms of iron for use in the company's shops. For a time the managers contemplated the erection of a Bessemer steel works in connection with the Cumberland rolling mill, but we understand that the project has been relinquished. The Union Pacific Railroad Co. found early in its history that it would be to its advantage to reroll its old iron rails instead of shipping them to some distant works, and in 1875 it put in operation a rolling mill at Cheyenne, Wyoming Territory, which continues to reroll old rails and also makes bar iron. Two years ago the Central Pacific Railroad Co. built a bar mill at Sacramento, Cal., to supply its shops with merchant iron. The Denver and Rio Grande Railroad Co. about the same time encouraged the erection of iron and steel works in Colorado, and the Colorado Coal and Iron Co. built a very complete iron and steel plant at South Pueblo, where pig iron, bar iron, nails and Bessemer steel rails are made, the connection of the railroad and manufacturing company being very intimate. In the same way, the Northern Pacific Railroad Co. is promoting the construction of extensive iron and steel works at Oswego, Ore., a few miles above Portland, the manfacturing company being known as the Oregon Iron and Steel Co. The plant will embrace blast furnaces, rolling mills and perhaps steel works. There may be other railroad companies in the country which have an active interest in iron and steel works, but if they have, they are not known to us. It is true that many directors of railroad companies and leading stockholders are also largely interested in iron and steel works along the lines of their respective railroads, but that does not establish a sufficiently close connection to come within the scope of our remarks.

Gaseous Fuel in Iron Manufacture.

The fact that there is always some loss in the generation of heat from solid fuels, and that its use, moreover, is attended by difficulties which may be readily avoided by the application of gaseous fuels, has attracted attention for a long time. We think, therefore, that Mr. Sutherland's paper on "Gaseous Fuel in Iron Manufacture," read before the British Iron and Steel Institute a short time ago, will be read with great interest. The subject has been steadily growing in importance and popularity for the past few years. Coal gas, perhaps the most generally known form of gaseous fuel, was, and is even now, much too expensive to be a successful competitor of coal, thus effectually barring its introduction, and some of the various other gases brought to public notice, though having the advantage of cheapness so far as the mere relation of cost and quantity is concerned, were found undesirable on account of their small proportion of combustible gases. Water gas has been found to yield the most satisfactory results, for though, compared practically with coal gas, its heating power seems only one-half, experience has shown that it may be produced at a much lower figure.

Returning to the advantages of gaseous fuels, both from points of economy and convenience, it is evident that the loss of heat above referred to and in the application of heat to economic uses is of special importance in metallurgical operations, where the fire is often large and urged to its utmost intensity until the substance under treatment has reached the desired temperature. The fire is then abandoned, and an excessively large proportion of fuel is uselessly expended. Solid fuels, moreover, as used at present, contain a variable percentage of foreign incombustible matter, which absorbs heat and gives no equivalent, and though this may also be said of gaseous fuels, it applies to them in a much more limited degree. Without attempting, however, to go into these details, it would seem that the items of labor and inconvenience incident to the use of coal would weigh heavily against it.

Mr. Sutherland, besides giving attention to a number of interesting points connected with the use of gaseous fuel, recounts his experience in dealing with explosions in the gas mains, the choking of passages by accumulations of pitch, &c. The cost of the apparatus for producing the gas, the interest and depreciation upon it, in addition to the cost of production, have, unfortunately, not been taken into account, but there is reason to conclude that these items amount to very little. It will, further, be remarked that Mr. Sutherland suggests the use in the Bessemer converter of a gas containing a large proportion of carbonic oxide in place of atmospheric air, claiming that in this way a soft, ductile metal similar to wrought iron might be produced without having to add any spiegel. Regarding this point it may be of interest to observe that Sir Henry Bessemer commenced experimenting in this direction as early as 1856. Almost every kind of gas was used, but to his extreme disappointment no good results were produced by any of them. In the course of his experiments he found that, having a good metal to begin with, sulphur and phosphorus being absent, decarbonized iron was capable of being produced by the simple action of the atmospheric air alone.

Opening Corea to American Commerce.

A dispatch from the American Minister to Corea, Lucius H. Foote, announces that the treaty concluded between the United States and the so-called "Hermit Nation" was formally ratified at Seoul on the 19th of May last. By this act the United States is foremost among the commercial nations to enter into treaty relations with Corea, with an accredited diplomatic representation to reside near that hitherto exclusive and almost unknown Asiatic Government. The American Minister landed from the steamer Monocacy May 13, at the open port of Chi-Mul-Poo. The Governor of the district, and other officials from the capitol, soon came on board and inquired concerning the nationality of the vessel and the objects of her visit. Two days later a vice-president of the Foreign Office, accompanied by a secretary, presented a dispatch to Mr. Foote, inviting him to Seoul, where his presence had been expected. Thereupon the Corean flag was hoisted on the Monocacy and saluted with 21 guns. A long and pleasing conversation ensued, in which the Coreans expressed strong hopes of friendly intercourse being established between the two countries. May 17 the entire party, including Commander Cotton of the Monocacy and eight officers, took sedan chairs over a narrow road, traversing ranges of well-tilled fields and valleys. Four miles from the city they were met by the Governor of the district, and from that point forward they became objects of intense interest to people who assembled in thousands along the route. After passing one of the four imposing gateways, they were escorted to the office of the Assistant Secretary of Foreign Affairs, where they received every attention until the ratifications were exchanged. Min-You-Mok, the Minister of Foreign Affairs, and other officials seen on that occasion, are described as "well versed as to the condition of other countries," and the disposition everywhere manifested was of the most friendly character.

In contemplating the probable results of the treaty with Corea, we can only say that neither the city of Seoul, with its one-story thatched houses, nor the humble cottages of the peasantry, afford much indication of abounding wealth. The people content themselves with plain robes of cotton cloth, and conical hats woven from horsehair. Like the Japanese, they are happy in their simplicity, and are therefore conscious of wanting very little. But when familiarized with foreign arts and appliances, a great change in these respects must follow, giving rise to profitable traffic. Meanwhile, those who expect little will not be disappointed.

Two New Ocean Cables.

A company called the American, British and Continental Cable Co. has been formed in London for the purpose of laying two ocean cables between England and America. One of the two cables, which are being made at the Henley Works, London, will be laid, it is said, before the close of the present year. It is understood that the cable company and the Postal Telegraph Co., which is to be its American connection, have signed a rigid contract, with heavy penalties, not to sell, lease or co-operate with the Western Union or the present cable companies. It is understood that the postal people are now getting out their material for running a large six-wire copper line from New York to Bangor, Me., via Boston, with offices in the cities and towns along the route. It is thought that this combination promises to be a stronger competition to the Western Union than even the late lamented Mutual Union. Some of the figures on which the new cable company base their claim to be able to do a remunerative business with low cable tolls are interesting. The cables now in operation, all of which are in the Western Union system, are the Anglo-American Co.'s four cables, costing about $35,000,000; the Direct United States Co.'s one cable cost some $7,000,000; the French cable cost $8,400,000, and Gould's two American cables cost $14,000,000, making a total cost of about $64,400,000 for the eight cables. Of these, four are old, having been laid in 1869, 1872, 1873 and 1874, respectively, and four are newer, dating from 1880 and 1881, respectively. The average cost of each of the eight is thus about $8,050,000. Now, the "A., B. and C. Co.," they claim, can lay their two main cables across the Atlantic and two cables from Great Britain to the Continent at an aggregate cost of only $7,500,000. In order to pay 5 per cent. on the capital invested, the joint companies must earn $3,220,000 per annum, net, while the new company requires only $375,000. The joint companies have to provide a renewal fund for old cables, while the new company will require nothing for years to come. The joint companies have to pay the expenses of four boards of directors and four sets of office men, and over $1,000,000, while the new company's expenses will be only about $250,000. Furthermore, the joint companies have to pay for obtaining their Continental business, while the new company, with their own Continental cables, can retain the extra tolls, which will average about 5 cents per word. A large increase in the volume of business is also expected naturally to follow the adoption of a 12 cents per word rate.

German Views of the Iron Situation.

The Hamburg *Borsenhalle*, in its issues of June 20 and 21, has two editorials which deserve a passing reference. One treats of the respective merits for shipbuilding purposes of English and Rhenish iron. In another article the fluctuations in the English and American pig-iron markets since 1879 are reviewed, and in general outline the causes which have been operative and still remain so. For some years past the Germans have begun to furnish, from the shipyards of Hamburg, Kiel and Stettin, not only iron steamships and torpedoes for the navies of Germany and China, but they have turned out large steamers for the German and other merchant marines. On June 17 a meeting of iron and steel manufacturers was held at Dusseldorf, at which the assertion was made by one of the leading men present that German iron was superior to English for marine purposes, and that the marine underwriters might be prevailed upon to raise the standard of classification, and in this manner so favor Rhenish soft steel, for example, that German ship owners would be, so to say, compelled in their own interest to buy this Rhenish product for naval constructions. The *Borsenhalle* ridicules this idea, the more so as it is partially put forward under the garb of humanity—the saving of human life exposed at sea—and remarks that German ship owners will best know their own interests and buy the best material in the cheapest market, without the necessity of being indirectly constrained to confine themselves to Rhenish soft steel.

Concerning the iron situation in this country, the *Borsenhalle* is of opinion that the crisis it is passing through at present is due even more to the gradual transfer of pig-iron production from Pennsylvania to Southwestern Virginia and other localities in the United States than to the falling off in railroad building, and that the drooping tendency of pig iron will not unlikely continue until the transfer is complete, and we can count on a permanent supply of cheap pig iron. It adds that new lines of railroad now enable the pig-iron producer from a distance of 200 or 300 miles from the Atlantic to largely undersell the Pennsylvania blast furnaces, because he operates in a region where both coal and rich iron ores abound, combined with lower wages. These views cannot be said to be of great value, but they are interesting and show how matters pertaining to the iron trade are regarded on the other side.

National Mechanical Expositions.

Few of those who went through the Railway Exposition, attending to its lessons and considering the value which was being derived from it, but felt that at some future time such an exposition must of necessity be repeated on a grander scale and with such improvements and alterations as could be suggested from the lessons taught in Chicago. It seems highly desirable that in the immediate future a national organization of manufacturers should be formed for the express purpose of repeating, if the term may be allowed, the Railway Exposition under the very best conditions. At the present time there is nothing in the country of a truly national character in the exposition line. We have each year a series of local shows of greater or less interest. Their value, however, is chiefly to those who have popular goods to sell—soaps, sewing machines, canned fruits, horticultural products, domestic apparatus of various kinds, and the thousand and one things which the great mass of the people use. None of these shows, whether it be the Mechanics' Fair at Boston or the great fairs at Cincinnati or Chicago, are of sufficiently national character to attract a large number of exhibits in any one mechanical line.

The size of the country and the importance of its manufactures are evidently sufficient to make a great show, fair or exhibition once in from three to five years really profitable to the manufacturers. Such a fair might with advantage include rather more than the Chicago fair, and possibly not be restricted simply to what pertains to railroads. In other words, it might be extended in its scope, and it need not of necessity include every branch of railroad supplies.

The first point to be understood in the discussion of such an organization should be that its objects would not be money making; in other words, a successful exhibition of this kind, planned with regard to the greatest interests of the manufacturers, the railroads and the purchasers, would not, and could not of necessity, return a dividend. It would be an extraordinary thing if such an exhibition was able to pay its own expenses. In fact, it would probably be less expensive to the manufacturers to foot all the bills without attempting to put it on the basis of a show, than to adopt those methods which are absolutely necessary in order to make any show pay its expenses.

To make this point clearer we must bear in mind that, for a great exhibition to show a net balance, it is necessary to prolong it over a considerable length of time, to advertise in order to bring crowds of people, to make arrangements with railroad companies in all directions and to employ the general methods of the popular showman. All this means a very heavy expense to the exhibitor in keeping up an exhibit of costly goods, paying the expenses of showmen or those in charge of the exhibit, and the variety of other expenses which are too well known to those who have ever had an exhibit in a fair to need enumeration here. It seems probable that by reducing these expenses one-half by shortening the length of the exposition, a sufficient amount of money could be realized to meet the lessened exposition expenses and make up for the decreased income from admissions. This would be a gain, inasmuch as the business of the manufacturer would be less disturbed, and the services of valuable men would not be taken from home offices for so great a length of time.

It has been proposed several times, in discussions of this question, by gentlemen with whom we have talked, to reduce the time of the exposition from the hundred days, which is the common limit, to six weeks. One or two have thought eight weeks might be profitably used. The real point of the exposition is to bring the buyers and sellers together. If the time is short and this can be done, the seller can afford either to be present in person or to have during the whole exposition a representative man from his establishment always in charge of his exhibit. In this way the purchaser is sure of meeting a principal when he desires to examine goods or machines, an advantage which can hardly be overestimated, and which was strikingly illustrated at Chicago.

In deciding upon the time and place of such a meeting, the conditions ought to be made quite as favorable as at Chicago. The Mechanical Engineers, the Master Car Builders, the Master Mechanics, the Civil Engineers, and the Purchasing Agents, all held their meetings either in Chicago or in its immediate vicinity, and the greater portion of the members of these societies visited the exposition during the three weeks in which it was in full operation. These were the men whom the manufacturers were anxious to meet, and, having met them, there were no other people in the country for whom it was really worth while to prolong the show. Should an organization be effected, and an attempt made to repeat this exposition, this matter of the coincidence of the meetings of the societies with the exposition should be

carefully attended to, and, if possible, the location arranged so as to present the same advantages which were obtained at Chicago. Three years, it seems to us, is a sufficiently short period of time. Five years seems to be too long, for in the longer period the the necessity and desirability of bringing people together to exchange ideas will become very great. The manufacturers and purchasers both will wish to know what is wanted in the market and what is made, and ideas in regard to wants and products can be profitably exchanged in less than five years. In less than that time, too, almost every manufacturer will have introduced a sufficient number of changes and improvements to wish to have his patrons familiar with them. In one's own works it is almost impossible to find room or to go to the time and expense of putting up such a line of samples as is possible in an exposition. Very few manufacturers, especially of the heavier kind of tools, ever have as good and complete an exhibit in their own works as they can furnish for a short period at a great exposition, and, when such a line has been got together, advantages can be illustrated and processes demonstrated far better than at home, where conveniences are not at hand.

In such an exposition as we have sketched there would be comparatively little of a popular character. No matter how long the time might be extended, there would be very little to attract crowds, and hence it would, as we have said, be impossible for the exposition to pay for itself under any circumstances. Take the case of Chicago, and suppose that the deficit reaches its highest possible figure, say $20,000, which assumes that the lumber of the "annex" had to be given away. The firms represented in that exposition could well afford to meet that deficit out of their own pockets, since the return which they could obtain for it is far beyond the outlay. This subject deserves wide and immediate consideration. It is exceedingly important to almost every manufacturer in the country, and the time, even though five years be assumed between the exhibitions, will be altogether too short for a thorough canvassing of the subject and effecting an organization.

Hotels for Factory People.

One of the notable features of the town of Elgin, Ill., in connection with the watch factory, is the hotel or boarding-house under the control of the factory management, by means of which they are enabled to regulate to a certain extent the price of board in town. Its dining-room has a seating capacity of 500 persons, and there are about 150 sleeping rooms, arranged to accommodate two persons each. The building consisted originally of an L, to which a second and larger wing has been added. It is finished throughout in a very neat and pleasing style, and the furniture and furnishings are much better than are usually found in a country hotel. The location is pleasant—on the hillside near the factory. In addition to those who board regularly in the hotel a very large number come for table board. There is a billiard and smoking room furnished with four tables, a parlor 40 feet square, very tastefully furnished, and a reading-room, where there are a considerable number of books and periodicals. The top floor is devoted to unmarried ladies, the next floor to married couples, and the lower floor to single gentlemen. The table service, food and attendance are first-class, and the cooking is certainly as good as that which is obtained from any large and popular first-class city hotel. The board ranges from $3 a week for girls, two in a room, to $5 for men with single rooms.

The hotel we have described above is, we think, in many respects a unique institution. Though many corporations have carried on boarding-houses with a view to reducing the wages and making a double profit out of their employees, yet a hotel conducted on the same principles as any other hotel, but with the prices so adjusted as to leave only a nominal profit, is a thing which we believe has not been previously attempted. As we understand it, the policy of the president of the company is to cover hotel expenses, and not to expect a profit on the investment. As might be expected, this keeps the price of board down to a reasonable figure in a small town where, were it not for this institution, the great demand for boarding places would undoubtedly cause an abnormal rise. A family hotel of this kind offers a great many peculiar advantages to the workman, in giving him comforts which he would hardly be able to get did he depend on the boarding-house, and at rates which are certainly far below what could be expected from an individual who undertook to keep a boarding-house on a smaller scale.

It may not always be possible for a corporation to establish a hotel or a large boarding-house, yet there are many cases where, by a comparatively small investment in this line, a large corporation could secure advantages for its workmen and indirect profits for itself of a very material kind, by the expenditure of a moderate sum in house and furnishings. For such a scheme to be successful, however, it is necessary to find a man peculiarly qualified to keep such a house. As a means for guarding the health, morals and general welfare of a large population employed in a factory, this hotel system seems to offer greater advantages than any other which has been proposed, and at the same time without the disadvantages and annoyances to the workmen which have made the ordinary boarding-house so obnoxious in most places where it has been tried.

The tragic death of Mr. William K. Seaman, chief engineer of the steel works of the Lackawanna Iron and Coal Co., under circumstances peculiarly distressing, need be mentioned only as warning ambitious young men not to overtax their strength by work beyond their capacity. There is in this country every temptation to superheat one's energies, to carry excessive pressures and to run up one's piston speed a great deal too high. Every year a score of promising lives are blighted by the physical and mental ruin wrought by overwork. Mr. Seaman was a very talented young engineer, and before most men have shaped a career had attained a position of greater responsibility than he had the strength to fill. His anxious work by day and night brought him insomnia, with its attendant evils, and in his last conferences with his official superiors he seriously expressed the intention of resigning his position and going to work in the shops as a mechanic. Had he done so he would have escaped his unhappy fate, but probably the resolve came too late. There is no country of the world where bright boys find the same inducement to burn their candle at both ends as in this, and the young man who has to climb slowly to a position of responsibility has cause for thankfulness that he cannot outrun his capacity.

A commendable effort to prevent, or at least diminish, accidents in coal mines is about to be made in British mining districts. The movement, which cannot be exactly termed one of recent origin, having been agitated a number of years ago, consists in offering prizes for the best essays on the prevention of accidents in collieries. Former attempts in this direction, however, had the objectionable feature of admitting anybody to the competition, and, as a rule, the prizes were carried off by mining engineers, whose elaborate treatises on gas explosions, &c., left little, if any, hope for the ordinary miner. In the forthcoming competitions, on the other hand, the judges will be practical men and the competitors working miners only, so that valuable practical suggestions are anticipated. One of the British mining journals aptly describes the present situation in regard to mining accidents by stating that, as the rule, the miner regards coal getting as his only remunerative employment, timbering bringing him no money in return for his labor. As a consequence, he neglects the latter until danger becomes very apparent, and even when aware of this, if timber be not at hand in his stall, he will not go in search of props. Many of the accidents which occur are owing to this cause alone, loose stones dropping from the roofs of the workings. Practical miners, therefore, it is hoped, will not be slow to avail themselves of the opportunity thus presented to offer suggestions bearing upon the problems involved in safe working, and the results of the competition will undoubtedly be beneficial in many directions.

Tho disabled Cunard steamship Aurania was safely towed into port a few days since. Up to the time of the accident her voyage was all that could be desired, and had it not been necessary to stop the engines for some eight hours to allow a hot bearing to cool, phenomenal time, it is said, would have been made. As it was, the steamer's actual time from Queenstown to the point of the accident —12 miles south-southwest of Shinnecock Light—was only 6 days and 22½ hours, and had her machinery remained intact she would have won a record pressing close upon the fastest time which the fastest steamship has yet made. Shortly after sighting land, the connecting-rod attached to the middle piston snapped, and the suddenly liberated piston-rod shot up through the top of the cylinder, completely demolishing it. The lower portion of the connecting-rod was, of course, fastened to the main shaft, and as this continued to revolve, the large arm of steel went flying about like a huge flail. The effect may be readily imagined, and before the steam supply could be cut off from the remaining cylinders, an immense amount of damage had been done. The vessel is now safely docked, and repairs will be immediately proceeded with.

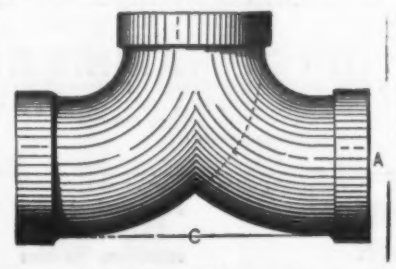
An announcement has recently been made in the English newspapers by W. M. Flinders Petrie in regard to the tools used by the ancient Egyptians in stone-cutting, which is the most novel piece of information communicated to the mechanical world for a generation. It is, in effect, that the ancient Egyptians, in their stone-cutting, used the equivalent of the diamond drill and diamond saw. What particular gem was used for the cutting points is not at present decided, but it was probably either a sapphire or beryl in only the softer stones, for in the harder ones the experiments made show that their edges crumbled with far less pressure than is necessary to take the cuts which are everywhere found common. Not only was the diamond saw used, but the hollow drill for removing a core, and samples of these cores have been illustrated by Mr. Petrie. Only one side of the question has yet been heard, but from examples shown one would expect that there was little to be said on the other side of the question. The wonder is that the discovery was not made years ago. We hardly see how any one could have examined stonework produced in this manner without discovering the character of the tools used.

The Cleveland Meeting of the Mechanical Engineers.

We continue our reportot papers and discussion at the Cleveland meeting, from previous issues:

The discussion on Professor Maynard's paper on "The Bower-Barff Process" was exceedingly interesting, but consisted chiefly in the asking and answering of questions by different gentlemen. In regard to the durability of the coating, little can be said until greater time and wider range of circumstances can be had for testing.

In regard to this durability, Mr. Partridge said that there was one statement made in respect to the endurance of this coating-which, to those who are familiar with plumbing work, is more satisfactory and entirely conclusive than any other thing that could possibly have been suggested as a test. As he understood the statement, it was to the effect that a urinal had been coated by the process and had been in constant use for six months without showing rust. Of all tests for rusting of cast or wrought iron, the urinal is the greatest. No amount of painting, galvanizing, lead-coating or enameling will protect an iron urinal. The acid seems to have a more destructive action on the iron than anything else that iron is likely to come in contact with. If the coating will stand that, it will stand anything that it is likely to be employed in. It seems, however, that this test, conclusive as it would



Standard Cast-Iron Fittings.—Fig. 1.—Tee for Steam Engine Fitting.

have been, has not been repeated in this country, so that really there has not been a definite trial here as yet.

Mr. Baldwin's paper on "Standard Cast Iron Fittings" was next in order, and will be found elsewhere in our columns. The discussion which followed brought out several important points in regard to the necessity for fittings of different characters for different classes of work.

Mr. Barr said: "I have had a great deal of experience with steam fittings, and I think others who have had occasion to use steam fittings will agree with me in this, that for elbows especially, the fittings are too small, and that is one of the defects which I think is quite as important in considering this question as the matter of strength, and the threads and the other things that were named. Now, when we come to take the embarrassment which, naturally enough, comes from buying fittings in the open market, no manufacturer can afford to do that long. He will soon have to settle down to some one set of fittings. Several years ago I had occasion to design a series of engines which were to be built in large quantities, of which I suppose there are some 1500 or 2000 now running, and turning out at the rate of 300 or 400 a year, but, not knowing where these engines had to go, the pipes and the fittings had to be gotten out entirely by drawings, the distance from the center of the boiler to the center of the engine being marked on the drawings. Perhaps these fittings would be cut and boxed and lie in the warehouse six months before shipment, so that in a manufactory of that kind it is very

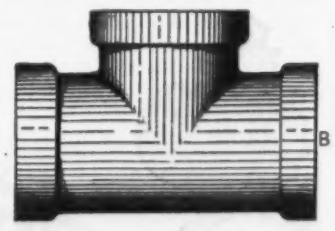


Fig. 2.—Common Tee Fitting.

important that we know exactly what we are going to get, because we don't know where they are going. Now, for small engines using ordinary slide valves, in which the initial pressure in the cylinder would probably not be over two-thirds of that of the high boiler, in which the ordinary governors are used, and the steam wire-drawn, I do not know that it makes so very much difference about the size of the fittings, because the pressure is reduced more at the governor than it is at the bend. But when we come to take automatic engines, and especially engines of large size, then the real difficulty to the manufacturer comes in, and it has been my practice for some years to use the ordinary fittings up to 4 inches, and above that to make them. One reason why I would not use a fitting such as is shown here is simply because the turn is too abrupt. And another thing, I would not use a tee—that would be that scale reversed. It has been my practice for some time, in making tees for large engines, to make them like the sketch Fig. 1, and using the same scale for the elbows. I cannot give you the dimensions, but you will readily see the difference between that and the second sketch, Fig. 2, in the flow of steam, especially when you guarantee that you will get an initial pressure in the cylinder only one pound less than that in the boiler with the engine 100 feet from the boiler. That can be done very easily if you get the particular shaped bends and tees, and if there is to be any discussion on that paper, I should like to know if there are any here who have experimented with the actual loss in pressure due to these abrupt bends."

In answer, Mr. Baldwin replied: "I suppose the gentleman knows that my proposition was not to accept that elbow. My elbow is simply drawn by that scale. I want the scale accepted, and the committee will determine what the elbow will be. The engine industry is a large one; but there are other industries that use pipe and fittings larger than the engine industry that have to be considered in this question. There are steam fitters, gas fitters and water men who all use elbows. The elbows must have some pipe, and you must make the radius as long as possible, but you must not make it so long that the fittings can be used only by the engine man. He can bend his pipes in his fire if he wants to, and make his radius as long as he likes. The main thing is to have uniformity, so that all elbows will be alike. Now, there are fittings in the market for any one who wishes to go into it. A man says he is selling a 1-inch elbow for so much money, and it will connect two pipes together, after a fashion. Another sells a 1-inch elbow which weighs twice as much, and has more radius, but he can get no more money in a general way than the man that offers the light elbow. This has to be taken into consideration in establishing a standard elbow or fitting. Referring to Mr. Barr's sketch of the two elbows with a T, shown in Fig. 1, I would like to know whether it is intended that the lengths should be the same."

Mr. Barr: That is intended for a very large pipe. When you get to making those tees from 6 to 12 or 15 inches in diameter, you don't want to carry that line *c* straight across.

Mr. Baldwin; There are other industries to be considered, and you can make your special fittings. The length of your fittings can be the same as the trade fittings if you please, so that a man ordering them knows what they are.

Mr. Barr: I am talking about fittings specially adapted for large automatic engines, in which there must be no difference in pressure between the steam-chest and that in the boiler, no matter what the length of intervening pipe may be.

Discussion brought out the fact at this point that difference between the boiler pressure and initial pressure in the cylinder, even over long distances, can, by proper fittings, be reduced to one pound, and that there were no two houses in the trade who were making fittings that will go together. Mr. Baldwin thought that the society could adopt the fittings of Morris, Tasker & Co., and persuade dealers to adopt the standard, the object of the standard fitting being to do away with the desire or the possibility of making light, thin and short fittings. It was remarked that a standard for bolts and nuts had been adopted, and was possible, but the rejoinder was then made that even bolts and nuts made within six months will not fit.

Mr. Le Van said: "The point I want to make is, if Morris, Tasker & Co. have a standard set of fittings which is adopted by all the manufacturers in Philadelphia—and every one will admit that the interest in pipe fittings is as large, if not larger, in the city of Philadelphia than any other city in the country—if we have a standard which is a good one, why should we change that? All we could recommend would be that other dealers should come to that standard. As I said before, I have been on a committee of the Franklin Institute for the last three years, and I don't know how many letters we have written, but no one seems disposed to give up his method. We could only recommend something."

President Leavitt thought that little good would follow the society's taking up this subject, if the Franklin Institute has not been able to accomplish anything in three years, but Mr. Le Van thought the Institute might have some assistance from the society. Mr. Walker here related his experience in getting taps for standard fittings. He had bought some right and left hand taps, one Pratt & Whitney and one Morris, Tasker & Co., owing to his being unable to get them both from the same maker. In taper they differed $\frac{1}{16}$ inch at the large and almost $\frac{1}{16}$ at the small end. It was an embarrassing situation, as part of the fittings were already drilled. He sent to town, but unfortunately there were no two in stock by the same maker. Mr. Henning had found exactly the same trouble in making fittings from different taps and dies; all were different, and neither one of the taps would fit the old ones. Finally, his only way out of the difficulty was to cut a tap in the lathe and match a die which he had from a certain maker. Mr. Baldwin asked Mr. Leavitt whether this was not an argument in favor of standard fittings. Mr. Leavitt replied that "standard fittings were all right, but the question was, How was the society to accomplish this? The point I wish to make—simply as an individual, not officially—is whether the influence of the society, through its transactions and the expressed opinions of its members, will not go further, perhaps, than the appointment of a committee. If we appoint a committee to consider this subject, it will become a sort of a charnal house for all that is said on the subject, whereas what we say now is fresh and will be spread broadcast, perhaps, through the country, so far as it is worth going, and we can personally, perhaps, influence men. Certainly, I feel as strongly as Mr. Baldwin on the subject, because, like one of my men who says when a thing don't suit him he feels like saying 'cuss words,' I have been in that condition oftener from the use of steam fittings than perhaps from any other cause."

Mr. Baldwin: I want to state, for the benefit of the gentleman that asked about taps, that in Robert Briggs's last paper he will find what he wants on tap and threads pertaining to fittings. It is very complete there. It is in the "Proceedings of the Institute of Civil Engineers of Great Britain, 1882-83," Part I. [The paper was published in Nos. 71 to 76 of *Mechanics*.]

Mr. Grant: For eight or nine years I had charge of the tap and die department of the Pratt & Whitney Co., Hartford, and, when we started to make pipe-taps, we went to a great many different people who were making them, to find what the standard taper was. The standard sizes we got at very easily, and the point of the taper was turned so that it just came through the gauges; but when we came to the tap, we found it varied all the way from $\frac{1}{16}$ inch to 1 inch to the foot. We took a tap that was made in Philadelphia, and we put that on a table lathe with a taper-turning attachment. We found the taps from that maker varied from ½ inch to the foot to 1 1/16 inches to the foot. We adopted 1 inch to the foot. I have not anything to do with the company now, and have not had for two or three years. I understand that they have changed that taper to ¾ inch to the foot, as being the recognized standard taper.

SPIRAL SPRINGS, COMPRESSIVE AND TENSILE.

Mr. Oberlin Smith, in the course of his remarks on this subject, said: "In cases where large quantities of springs are required there is applicable a method which consists of forcing the wire through a spiral die by means of the rolls. This delivers springs of indefinitely long pieces. In regard to material for spring wire, say ½ inch in diameter and below, there is nothing, on the whole, so satisfactory as hard drawn brass. Cheaper springs made of hard drawn iron and steel are also good. There is more strength and elasticity ob-

The Schedule of Bar Iron Extras.

We have received from Mr. W. E. S. Baker, of Philadelphia, secretary of the conference of bar-iron manufacturers recently held in Philadelphia, the following revised schedule of minimum extra prices above the base bar price, to be charged for extra sizes. It is an official revision of the schedule published in our issue of June 28:

* { Round and square iron, ¼ to 2 inches.
{ Flat iron, 1 to 4 inches x ⅛ to 1½ inches.
{ Flat iron, 4½ to 6 in. x ⅛ to 1 inch.

* Regular bar sizes not extra.

ROUND AND SQUARE IRON, EXTRA.

	Per lb.	Per ton.
⅛ and 11-16 inch	1-10¢	$2.24
½ and 9-16 "	2-10¢	4.48
7-16 "	4-10¢	8.96
⅜ "	5-10¢	11.20
5-16 "	6-10¢	13.44
¼ and 9-32 "	7-10¢	15.68
2⅛ inches to 2⅞ inches..	1-10¢	2.24
3 " 3½ "	3-10¢	6.72
3⅛ " 4 "	5-10¢	11.20
4⅛ " 4½ "	6-10¢	13.44
4⅜ " 5 "	8-10¢	17.92
5⅛ " 5½ "	1¢ extra	22.40
5⅜ " 6 "	1 5-10¢ "	33.60
6⅛ " 6½ "	2¢ "	44.80
6¾ " 7 "	2 5-10¢ "	56.00

FLAT IRON, EXTRA.

1 to 6 in. x ¼ and 5-16 in.	2-10¢	$4.48
1 x 3-16	4-10¢	8.96
⅞ x ⅜ to ¼	4-10¢	8.96
⅞ x ¼ and 5-16	5-10¢	11.20
⅞ x 3-16	6-10¢	13.44
¾ x ⅜ to ⅛	4-10¢	8.96
¾ x ¼ and 5-16	5-10¢	11.20
¾ x 3-16	7-10¢	15.68
⅝ x ⅜ to ½	5-10¢	11.20
⅝ x ¼ and 5-16	7-10¢	15.68
⅝ x 3-16	9-10¢	20.16
½ x ¼ to ⅜	1 1-10¢ ex.	24.64
½ x 3-16	1 2-10¢ "	26.88

[The larger sizes of flat iron are omitted, as they are made by a few mills only, and it is deemed best to leave to them the regulation of prices by mutual agreement.]

BAND IRON, EXTRA.

1½ to 6 inches x 3-16 to ⅛	5-10¢
1½ to 6 " x Nos. 11 to 12	6-10¢
1 to 1⅜ " x 3-16 to ⅛	6-10¢
1 to 1⅜ " x Nos. 11 to 12	7-10¢
⅞ x 3-16 to ⅛	8-10¢
⅞ x Nos. 11 to 12	9-10¢
¾ x 3-16 to ⅛	1¢
¾ x Nos. 11 to 12	1.10¢
⅝ x 3-16 to ⅛	1.20¢
⅝ x Nos. 11 to 12	1.30¢
½ x 3-16 to ⅛	1.40¢
½ x Nos. 11 to 12	1.60¢

HOOP IRON, EXTRA.

1¼ to 4 inches x Nos. 13 to 15	8-10¢
1¼ to 4 " x Nos. 16 to 18	9-10¢
¼ to 2 " x No. 19	1¢
1¼ to 2 " x No. 20	1.10¢
1 and 1⅛ " x Nos. 13 to 15	1¢
1 and 1⅛ " x Nos. 16 to 18	1.10¢
1 and 1⅛ " x Nos. 19 to 20	1.20¢
⅞ inch x Nos. 13 to 15	1.20¢
⅞ " x Nos. 16 to 18	1.30¢
⅞ " x Nos. 19 to 20	1.40¢
¾ " x Nos. 13 to 15	1.50¢
¾ " x Nos. 16 to 18	1.60¢
¾ " x Nos. 19 to 20	1.70¢
⅝ " x Nos. 13 to 15	1.90¢
⅝ " x Nos. 16 to 18	2¢
⅝ " x Nos. 19 to 20	2.10¢
⅝ " x Nos. 21 to 22	2.30¢
½ " x Nos. 13 to 15	2.30¢
½ " x Nos. 16 to 18	2.40¢
½ " x Nos. 19 to 20	2.60¢
½ " x Nos. 21 to 22	2.80¢
½ " x No. 23	2.90¢

For each gauge lighter than the lightest gauge given, 1-10¢ advance.

OVAL IRON, EXTRA.

⅞ inch to 1¼ inch	4-10¢	$8.96
¾ " " 13-16 inch..	5-10¢	11.20
⅝ " 11-16 " .	6-10¢	13.44
½ " 9-16 " .	8-10¢	17.92
⅜ " 7-16 " .	1¢	22.40

HALF-OVAL AND HALF-ROUND IRON, EXTRA.

⅞ inch to 1¼ inch	5-10¢	$11.20
¾ " 13-16 inch..	6.10¢	13.44
⅝ " 11-16 " .	7.10¢	15.68
½ " 9-16 " .	9-10¢	20.16
⅜ " 7-16 " .	1 1-10¢	24.64

All sizes not enumerated to be subject to special agreement.

Extra, for cutting ordinary bars to specific lengths, from 1-10¢ to 3-10¢ per pound, according to length and size, as may be agreed upon.

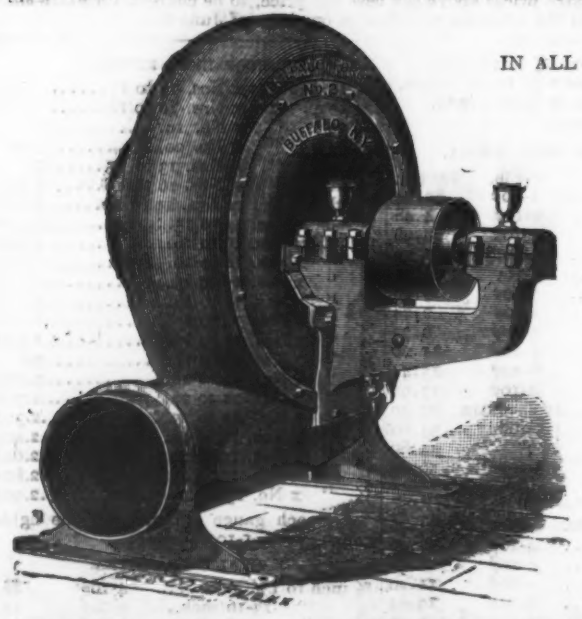
DECIMAL SYSTEM LIST, PER TON OF 2240 POUNDS.

Adopted by the association in selling iron, October 17, 1871.

1-10¢ =	$2.24	6-10¢ =	$13.44
2-10¢ =	4.48	7-10¢ =	15.68
3-10¢ =	6.72	8-10¢ =	17.92
4-10¢ =	8.96	9-10¢ =	20.16
5-10¢ =	11.20	1¢ =	22.40

NEW AND IMPROVED

Buffalo Exhausters,



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For Planing Mills, Ventilating Purposes, &c.

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WITHEROW & GORDON,

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Neshannock Iron Co., Pa.
R. H. Coleman, Lebanon, Pa.
Chester Rolling Mill Co., Pa.
Davenport, Fairbairn & Co., Pa.
Isabella Furnace Co., Pa.
Paxton Furnaces, Pa.
Spearman Iron Co., Pa.
Etna Iron Works, Ohio.
Milton Coal and Iron Co., Ohio
Winona Furnace Co., Ohio.
Moss & Marshall, Ohio.
H. Campbell & Sons, Ohio.
Hocking Valley Iron Co., Ohio.
Cleveland Rolling Mill Co., Ohio.
Meier Iron Co., Ill.
North Chicago Steel Co., Ill.
Union Iron and Steel Co., Ill.
Means & Culbertson, Ky.
Ashland Furnace Co., Ky.
Norton Iron Co., Ky.
Southern States C., I. and S. Co., Tenn
Sewanee Furnace Co., Tenn.
James C. Warner, Rising Fawn, Ga.
Ohio Iron Co., Zanesville, O.
Sloss Furnace Co., Ala

WILLIAMS, WHITE & CO.,

MOLINE, ILLINOIS.

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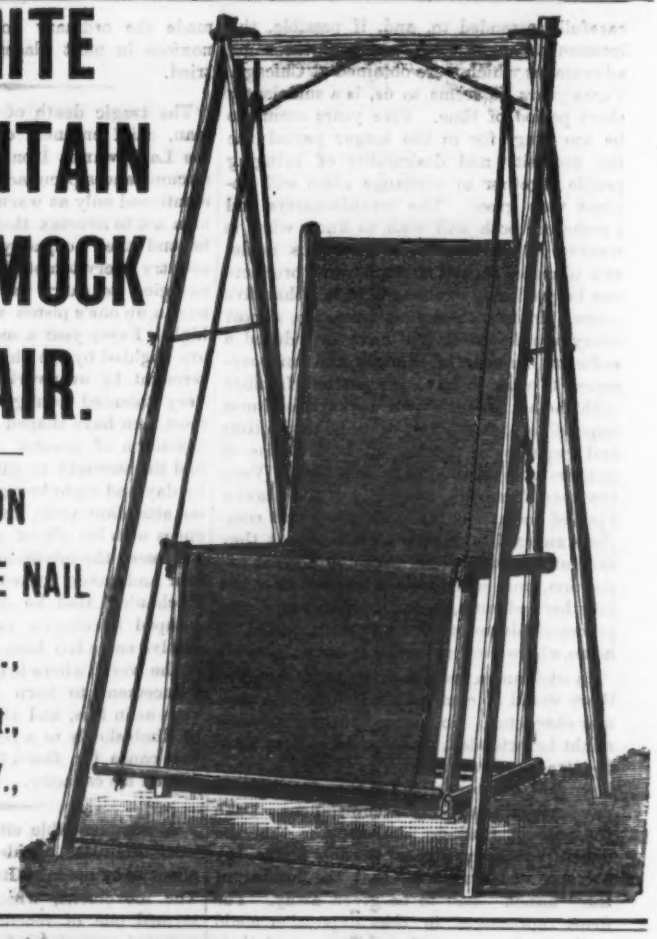

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PRICE, - - $2.45.

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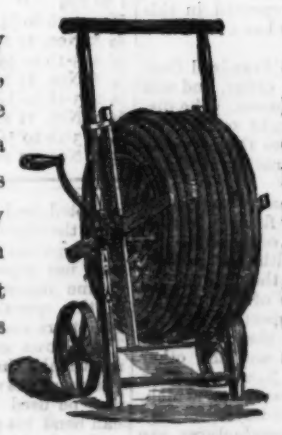

The engraving shows a Carriage with 150 feet of heavy ¾-inch 3-ply hose wound upon the reel; 200 feet can be easily coiled upon it. It is light, compact, and convenient to hand. For shipping great distances, this size, in common with the others, can be packed in crates, not set up, and occupy the least possible space.

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NO. 3 HOSE CARRIAGE.

In the engraving, this Carriage is shown with 200 feet of heavy ¾-inch 3-ply hose upon the reel. On account of the elevated position of the reel, this Carriage is convenient to handle; the stooping position required by some patterns of hose carriages, or in coiling hose in the old-fashioned way, is avoided. The axle is of wrought iron and firmly set.

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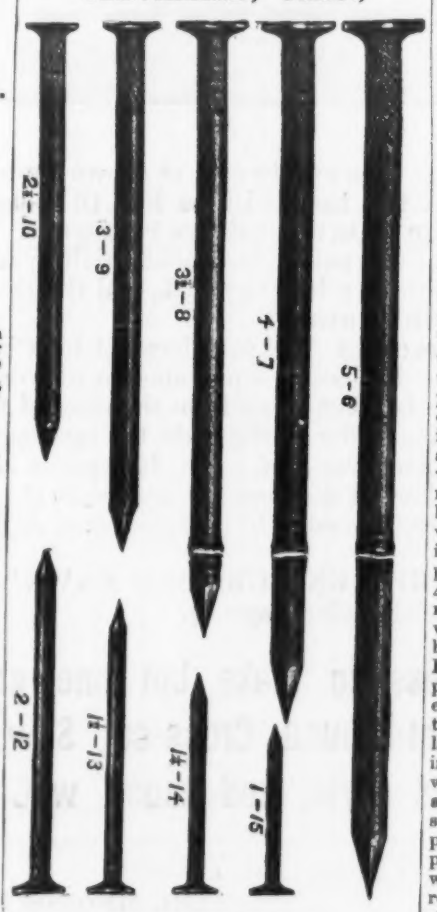

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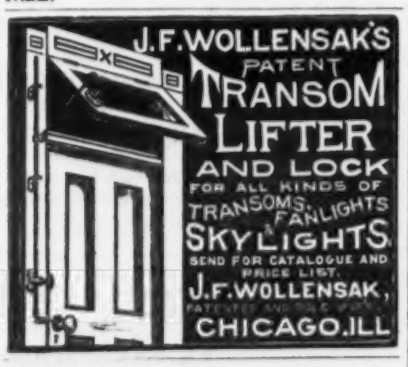

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tained by using the cheaper steel spring. The latter, however, is not so good as the others Such springs can be used to better advantage in car springs and other similar places. In cases where it is desirable to save room and dead weight, steel springs can be used to advantage. The popular prejudice in favor of steel springs is because softer springs gradually set under a load in consequence of improper design, the strains not being kept within the elastic limit. With respect to the theory, cause and action of spiral springs very little is known. Few books contain anything about it. Having had occasion to make springs of this character, I endeavored to find out some better principle than to cut and try. A search through a number of books which I had at hand revealed nothing but a few empirical formulæ relating to safety valve and car springs. Correspondence with some experimentalists elicited no information. Communication with various spiral spring manufacturers only developed the fact that this was something out of their line. While studying the subject the fact was pointed out by Professor Webb that the action of the wire of a spiral spring while it is being extended or compressed is almost purely torsional. This he discovered himself, but has since seen it in print. Since this paper was commenced I have seen a small book entitled 'Practical Mechanics,' by John Perry, in which several pages are devoted to spiral springs, and in it mention is made of this torsional action. When a spiral spring is extended or compressed in the direction of its axis, the strains are chiefly torsional. On the other hand, when the spring itself is subjected to torsion, the action of the wire is mostly bending. If the ends of the wire are bent inward, so as to run across the spring in the direction of the diameter, the points where they intersect the axis are the places where the force acts. [Holds up a coil with ends bent inward crossing the axis.] The center of the circle is down in the axis to which the pulling or pushing is done. A line from one of these points out to the center of the wire in the end of coil—that is to say, the mean radius of the spring—is the lever by which the wire is twisted. The equal of this in inches, multiplied by the force in pounds, gives the minimum torsion in inch-pounds. The results accomplished by this rule are usually sufficiently correct for practical use, though there is a small element of error, owing to the action of the wire of the spring not being wholly torsional, or the elasticity of the metal due to bending. The first would be *nil* if the coils were flat, but, as they vary, there is a slight bending action. To illustrate roughly, I hold in my hand a piece of lead rod ½ inch in diameter and 4½ feet long. By bending the ends at right angles, the levers are formed by which to twist it. It is, as you see, painted black, with a narrow bright line on it. Here, in the other hand, I show a similar piece coiled in a spiral 3 inches in diameter, the mean radius being the same as the bent ends of the straight rod. This latter I now twist 1½ times around, making the bright line look like a spiral. Lead was chosen in making these experiments, as having low elastic limit, so that it might set and thus record the strains. I use this particular number of turns, because it happens to come about right for the amount I want to extend. I now extend the coiled rod 14.13 inches, which is the distance the straight rod traveled in going 1½ times around. It has now been subjected to the same torsion as the rod, and if we uncoil it carefully it will be seen to have a line running about it the same way. It is essential not to twist the rod in uncoiling it. Now you see it has the same appearance. I did not get the bend exactly in the right direction in uncoiling it. It did not come around quite the same as in the other rod, but it is near enough to show the principle.

"I have recently made over 200 experiments on pairs of specimens, one of each being straight and the other coiled. Both of every pair were of the same length and cut from adjacent portions of the same piece of wire. Most of my experiments were made with hard brass wire varying in size from $\frac{17}{1000}$ up to ½ inch. Some of them, however, were made with iron; others with soft steel, tempered steel and phosphor-bronze. Some of these were square, but the majority were round wires. The wrought-iron rods were from ¼ to $\frac{5}{16}$ in size. The lengths of the rods were 10 inches and 20 inches—10 on the small ones and 20 on the large ones. The apparatus used was part of an old lathe head. I had had this lying around the shop for many years. I built it in Cleveland 27 years ago, when I was an apprentice boy. I used this lathe head for making these experiments, and the proper distance off was a little gripping arrangement for the other end of the wire. The journals were made small to avoid friction as much as possible. The wire was held in the universal chuck at one end and in the stationary grip at the other, allowing exactly 20 inches length. The wheel was exactly 10 inches in diameter, with a thin, flat band of brass for hanging the weight on. This was used for the larger specimens and a more delicate apparatus for the smaller ones. The experiments with the coiled springs were tried simply by hanging them to a hook and hanging a weight on the bottom end, and measuring the extension by the descent of the weight. The experiments with the straight ones were tried on the same principle, but the leverage was different on account of the diameter of the wheel on which the weight hung. The amount of elastic angular motion produced by a given moment in rods of the same length is inversely in proportion to the fourth power of their diameters. With different lengths it is directly as the length. This and other facts connected with torsional stress are the foundation for the various formulæ pertaining to spiral springs. These are proved by 212 experiments more or less approximately."

The discussion on Mr. Smith's paper was one which brought out an unusually large number of speakers and contributed a very considerable number of important, but not very well known, facts in regard to the use and management of spiral springs.

Professor Robinson said: "I would like to call attention to the fact that Rankine, in his 'Machinery and Mill Work,' has given the formula for spiral springs. It is not reduced there, it is simply stated. I have examined it myself carefully, and find that to be correct, and the reasoning on which the formula is deduced is exactly that given by the paper, and the subject matter leading to this result I have been in the habit of giving to my classes every year."

Mr. Richards: The theory of spiral springs, I presume, is well understood, as a scientific matter, to be a torsion of the metal, but there may be one or two facts that have been discovered practically in special machinery—manufacturing machinery, particularly—that may be of quite as much interest. Some 12 or 15 years ago I had occasion to assist in designing and building quite an extensive set of machinery, in which spiral springs were an essential part, and in the investigations preparatory to the work it was found that it was the custom to use springs very much too small for the work. For instance, a mechanic, in building a shaft, perhaps would have a dozen cams on it. They were to him important pieces. But the springs which produced the reverse movement were apparently neglected and considered a small matter. Consequently there were frequent breakages. That has been the experience, I think, of nearly all mechanics using quick-running machinery moved by springs. We find that with springs of average material, such as could be relied upon in the open market, if the spring were wound ten diameters of the wire and subjected to a motion of not exceeding one-fifth of its length, it would be practically an enduring spring, and *visa versa*, if it was wound five diameters of the wire and subjected to a motion of more than one-tenth its length, it would not endure the work. What I would call a good spring for such work is where a spring makes, say, from 60 to 100 strokes per minute 10 hours a day, 250 or 300 days in the year, and stands up to its work, as a usual thing, for two or three years. It seems to me that the endurance of springs is even more important than the proportion. In regard to the way to put in a spring, I think that 99 cases out of 100 will require a pulling spring for endurance. A push spring, if a spiral, it seems to me, is radically defective in theory and practical work, for this reason—that the spring, to do its work well and effectively, must have its axis in a straight line; it must continue so, and with a push spring this is practically impossible, because the wire, when wound spirally upon a core, fits the core. It expands a little, of course, in unwinding, but when it is pushed together over a core it enlarges its diameter. This allows the axis to take a zig-zag, curved course. Now, this bending on the core produces a greater torsion at that part than the average torsion throughout the length of the wire. That strains it beyond endurance. Consequently, in several cases tempered steel springs have had to be abandoned after long trial. Sometimes even, in order to produce enduring springs and get rid of the expense of constant renewals, I have known machines to be redesigned and lengthened out to the extent of 30 or 40 per cent. Brass of proper temper well drawn is the best material for ordinary springs for machinery. Next to that I think that mild steel well drawn will give the best satisfaction.

Mr. Smith: Mr. Chairman, I would say to Mr. Richards that I have used a large number of push springs in certain kinds of machinery. Necessarily, they do not run on rods, but in holes. In that case we always close the end of the spring in conically, until the end coil is very small indeed, or, in some cases, bend the end of the wire across, which, of course, gives the push in the axis, as it ought to. In a case like that where you can use a spring in a hole, it is all right; but a push spring upon a rod where you cannot do that is, I admit, very defective in theory, as Mr. Richards says, although in practice we find many in use with good results. For instance, large car springs, which are very short in proportion to their diameter, have just that effect. The pressure is brought on one side of the springs, and yet they seem to work well. Of course, the longer a spring is in proportion to its diameter the less that evil comes in. The matter of often-repeated use is a thing that probably has not been investigated in springs. I have made a few experiments where there could be a small spring and a medium stroke, and although it moved considerably within its elastic limit, it seemed to get shorter at the end of the medium stroke. But I did not carry out the experiments far enough to give any reliable data on the subject. But the trouble was partly owing to the spring wearing. It was run on a rod, and it wore a little on the inside, which, of course, weakened it. I have had similar experience with that which Mr. Richards speaks of, in having to lengthen springs myself. I know a class of springs built by parties in New York State on certain machines which were always giving out, either breaking or setting so that they failed to do their work, and I know that a prejudice came up against that class of machinery built with those springs. The trouble came from the fact that they had not been given length of spring enough for the amount of motion. And we found in a similar class of machines, although we put in a great deal longer springs than these other parties, that they set; and we doubled the length, and that added 100 per cent., and ever since they have given no trouble whatever.

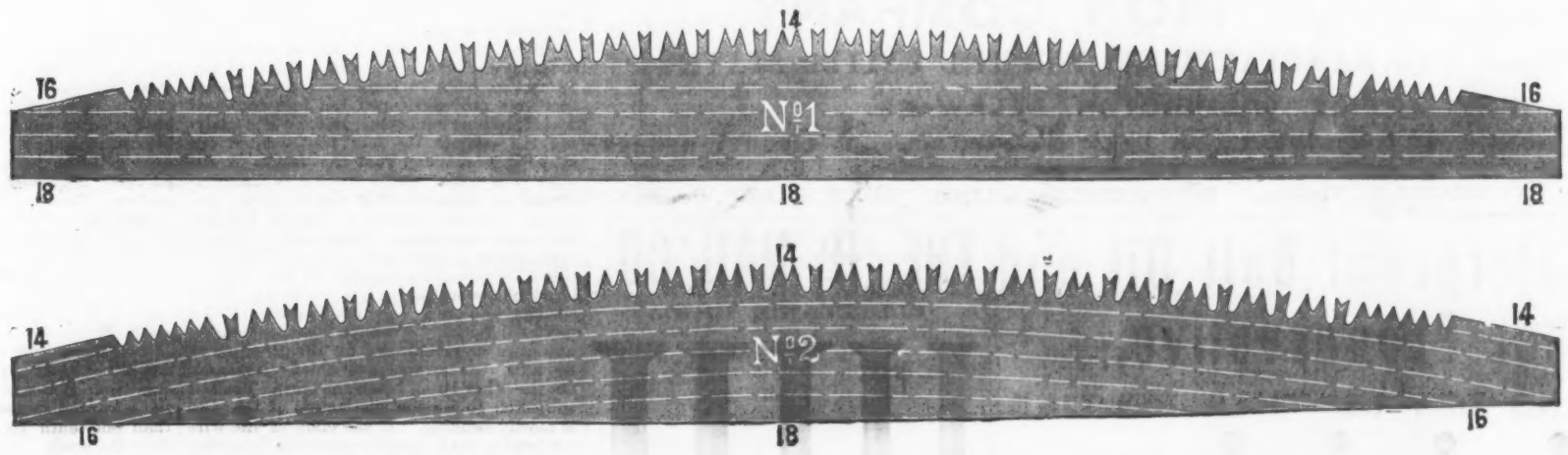
Mr. Richards explained, in answer to a question, that when a spring was wound in a coil of 10 diameters the working stroke was one-fifth of its length. Professor Webb mentioned the fact that full particulars in regard to all kinds of springs were given by Weisbach, and Mr. Woodbury said that spiral and coil springs were still more fully treated in *Der Constructeur* by Reuleaux.

Mr. Grant said: "In the works of the Pratt & Whitney Co. there are some automatic tap-threading machines running. They have springs on that run on a rod—push springs. The springs are wound open, and are about a tenth of an inch in diameter—that is, the spring wire is about a tenth of an inch in diameter, and they are wound open a trifle more than the diameter of the wire, and are not over six diameters in size. Those springs are compressed more than half their length; and they have been

THE "SIMONDS" SAW.

SOMETHING NEW IN CROSS-CUTS.

PATENTED DEC. 26, 1882.



Cross-cut saws have heretofore been ground in a straight line from end to end, as shown by broken lines in Fig. 1. As a result, a saw made 14 gauge thick at the center of the edge of the saw, and beveled to 18 gauge at the back, will be but 16 gauge thick at the edge near the end of the saw; or, in other words, **the teeth vary two gauges in thickness on the edge of saw,** as shown in diagram.

Our improvement consists in grinding the saw in crescent lines, parallel or substantially parallel to the cutting edge, as shown in Fig. 2, in which case **the edge or teeth are of even thickness,** while the inequality is thrown into the back, and the thickness of the saw remaining the same across its center as when ground the old way, **the ends are increased two gauges in thickness.**

The advantages derived from this method of manufacture are: 1st. The saw does not bind in the kerf as others, in consequence of being of even thickness throughout the cutting edge. 2d. It requires less set, for each tooth does an equal amount of work, and has equal thickness or strength to hold the set required for clearance. 3d. It will hold its set longer, as the wedge strain is taken away from the sides of the teeth. 4th. Being two gauges heavier at the ends, the strain of the saw is equalized throughout its length. 5th. The saw being stiffer at the ends, the operators can push as well as pull, without causing a curvature of the saw; consequently it does not vibrate, and cuts a smoother and narrower kerf. 6th. It requires less power to run it, for the reason that it cuts a narrower kerf and less timber, and also making an even in place of a varying kerf, it does not cut and recut at each passage of the saw, as is the case with others. 7th. It will not kink as easily as saws ground by the old method, as the taper from edge to back, being at right angles to a tangent of the cutting edge, serves as a brace to the saw.

By actual experiments in the Northwestern pineries, the "CRESCENT-GROUND SAWS" cut from 10 to 15 per cent. more timber than the straight-ground, and with much less labor, and in felling trees were especially advantageous.

Having adopted as a rule of our business to make but one grade of goods, viz., THE BEST, after August 1st, 1883, we shall cease making the Straight-Ground Cross-cut Saw, and produce only our Patented CRESCENT-GROUND, which is infinitely superior to the old style, and those who try them use no others.

Cadillac, Mich., April 12, 1883.

THE SIMONDS MFG. CO., Fitchburg, Mass.

Gentlemen: During the last year we have sold nearly three hundred of your *Crescent-Ground* Cross-cut Saws. We have sold them on an average of 85 cents per foot, and the parties who use them tell us they had rather pay this price, and even more, than to have the old-fashioned ground saw at 35 cents per foot. The most of our customers who are using them claim that your *Crescent-Ground* Saw will cut from 10 to 20 per cent. more timber (same labor being used) than any saw that they have ever used before.

Yours very truly, CUMMER & RAWLES.

Cadillac, Mich.

I consider the Simonds *Crescent-Ground* Saw as the very best saw in every particular that is in the market to-day. It is of better material, cuts easier, holds its point better, and lasts longer than any saw we have used, and it is not so liable to get sprung or break.

J. S. McDONALD, Foreman for McCoy & Co.

Camp of P. Hafley, Long Lake, Mich., Sept. 19, 1882.

THE SIMONDS MFG. CO., Fitchburg, Mass.

Gentlemen: We have tested your saws, and will freely say we think the Simonds *Crescent-Ground* is the best saw ever made, and that we have no use for any other kind.

J. McDONALD,
P. HAFLEY.

Camp of E. J. Capley, Round Lake, Mich., Sept. 20, 1882.

THE SIMONDS MFG. CO., Fitchburg, Mass.

Gentlemen: The *Crescent-Ground* Saws sent by you have been tested, and would say they are the finest cross-cuts I ever used, and think the mode of grinding a great invention.

Yours very truly, J. P. ALLEN.

Antigo, Wis., March 10, 1883.

SIMONDS MFG. CO., Fitchburg, Mass.

Gentlemen: The Simonds *Crescent-Ground* Cross cut Saws we sold gave most excellent satisfaction, and we shall be pleased to handle a goodly number next season. Some of our customers we have sold samples to, sent to your Chicago house and were supplied again from there. Yours truly, KOHL & LEYKOM.

Duluth, Minn., April 3, 1883.

THE SIMONDS MFG. CO., Fitchburg, Mass.

Gentlemen: Last December we purchased of your agent a few of your *Crescent-Ground* Cross-cut Saws, and would say cheerfully that they *more* than filled the guarantee given us by you. We think they will cut 15 per cent. more logs (with the same labor used) than *any other* saw we know of or ever used, and next fall we will want more of the same kind.

Yours very truly, CUTLER, GILBERT & PEARSON.

Crooked Lake, Mich., Sept. 20, 1882.

THE SIMONDS MFG. CO., Fitchburg, Mass.

Gentlemen: The *Crescent-Ground* Saws have been thoroughly tested, and would say they are much superior to any brand of cross-cuts we ever had, and think they will cut 10 per cent. more timber than any other saw in America. Yours very truly,

P. JOHNSON, Foreman for Dewing & Son.

Cummer Lumber Co., Camp No. 4, Cadillac, Mich., April 13, 1883.

THE SIMONDS MFG. CO., Fitchburg, Mass.

Gentlemen: We have thoroughly tested the *Crescent-Ground* Cross-cut Saws, and would say they work easier and cut faster than any other brand of saws we have used. During the last year we have tried five different manufacturers' brands of saws, and in our judgment your *Crescent-Ground* brand of Cross-cut Saws will cut 10 per cent. more than any of the five brands we speak of, and are not so liable to kink or spring as saws ground the old way, and they hold an edge a great deal longer. Yours very truly,

CUMMER LUMBER CO.,
W. W. CUMMER, President.

Crapo, Mich., Jan. 17, 1883.

MESSRS. SIMONDS, Fitchburg, Mass.

Have used the *Crescent-Ground* Cross-cut Saws for some months, and my experience with them shows that they exceed the percentage of gain guaranteed by your agent. We have been cutting the stock for our mill with three saws—two men to gang—where we formerly required four saws to cut the same supply. We are making an average of a million feet per month in my lumber output, from logs averaging nine to thousand. You may refer to me at any time. Respectfully, &c., L. P. SWIFT.

We manufacture five distinct lines of goods, viz.: Circular Saws, Crescent-Ground Cross-cut Saws, Straight-Ground Gang, Mill, Drag and Mulay Saws, Planing Machine Knives, and Paper-Cutting and Similar Knives, which we class as Special Knives. We claim for each line

A SUPERIORITY OVER ALL OTHERS.

For twenty years we have been engaged in a continued series of experiments to reduce the working of steel to a system, and in addition to the great variety of special tools which we have devised and have in use—covered by many patents—we have made several discoveries relating to the physical properties of steel—not known outside of our company—which insure to us a marked advantage in the quality and uniformity of the temper of our goods.

SIMONDS MANUFACTURING CO., Fitchburg, Mass.

BRANCH HOUSE AND FACTORY, COR. CANAL AND WASHINGTON STREETS, CHICAGO.

running, to my knowledge, five years, making perhaps 20 strokes a minute, and they are just as good as they ever were, for all I know. There were five machines running with two springs each, or ten in all. I think it makes a great difference in the way the springs are tempered. The distance between the coils was about once and a half the diameter of the wire. That was all the room we could possibly get in the spaces the springs ran in."

Mr. Smith: Speaking of temper, I would just say that tempered steel of proper quality is, I believe, the most elastic metal there is, and springs of that kind would stand a great deal more compression relatively to their diameter and the diameter of the coils, &c., than brass spring would; but I believe the brass springs are cheaper and more reliable where you can get plenty of length and plenty of diameter in proportion to the stroke, so as not to bring them down to the elastic limit. No doubt the springs Mr. Grant speaks of, if they were made of brass, would have set long ago; but if you could give more room for them the brass would probably be better.

The President: The Chair would remark that, having occasion some time since to design some springs for pump valves, which must necessarily be of brass on account of working in water, he investigated all the formulæ that he could find—those of Rankine, Weisbach and Reuleaux—and springs were constructed and tried. Finally a formula was given me by Mr. Atterburg, one of my studious draftsmen, taken from a German text-book, which, I think, came nearer than any other. These were quite light push springs and were some 3 inches in diameter, made of wire a little less than ⅛ inch in diameter. They were some 3 inches long, and the lift of the valve was about $\frac{6}{10}$ inch. The extreme pressure on them was not, I think, over 6 pounds, and we found that Mr. Atterburg's formula was nearer than any other. It will be interesting, perhaps, to the society, that Mr. Corliss in his engine uses a push spring made of phosphor-bronze wire about $\frac{1}{32}$ inch thick and some ¼ inch wide, the object of this spring being to keep the valve from lateral movement, the idea being that in case any foreign object should get under the seat the valve would come down on this spot until the next stroke, when the piece would be washed out without leaving its line of movement. These springs have valves of 2½ inches diameter. Where the maximum diameter of the spring is the same diameter as the valve, the upper diameter is possibly 1½ inches, and the whole hight of the spring 1½ inches. I do not know the endurance of those springs, but I should suppose in one of the engines mentioned there were from 40 to 50 revolutions per minute, and I think probably that a set of those springs will last a year. So that you can readily see with an engine running 12 hours a day how many compressions the spring is subjected to.

Mr. Henning's paper on "Some Notes on Steel" was listened to with a great deal of interest, although, from the number of figures which it contained, and other tabular matter, it perhaps might be considered more advantageously from the leisure of the desk than in a meeting. The discussion, however, was most animated, and brought out a great many points which were of general interest. The President spoke at length in regard to experiments which he had been conducting on steel for boiler plates, and the strength of various styles of steel. Mr. Le Van, Mr. Henning and the President added during the discussion the results of recent experience in the manipulation of steel for boilers, and the best and most economical method of construction. Mr. Le Van gave his experience in regard to a set of boilers recently built in Philadelphia that punched holes considerably smaller than was necessary for the rivets and reamed out after the sheets were in place, while giving a stronger boiler in steel lessened the cost over drilled plates by about 30 per cent.

On Standard Cast-Iron Fittings.*

BY WILLIAM G. BALDWIN, NEW YORK.

The absolute and positive necessity for uniformity in cast-iron fittings for wrought-iron pipes prompts me to take an interest in a work which evidently was commenced by the late Robert Briggs, of Philadelphia, a member of the Institute of Civil Engineers, and known professionally to many here. In a posthumous paper ("American Practice in Warming Buildings by Steam"), and I believe his last contribution to science, which was read before the Institute of Civil Engineers in England (Session 1882-83, Part I.), he gives many valuable data relating to wrought-iron pipe threads and fittings, and introduces a scale for dimensions of cast-iron fittings which does away with needlessly complicated formulæ, giving by simple straight lines the necessary measurements for laying out all sized fittings (elbows or tees) from ⅛ inch to 8 inches, inclusive. He had much to do with giving character and form to the present merchantable fittings and valves, and developed—for none knew better than he—the condition into which competition in prices was degenerating a branch of industry which may be said to be purely American.

Wrought-iron pipe is standard in size, because it cannot well be otherwise, and the only way it can be varied is in the thickness of the iron from which it is made, as the outer diameter must be sufficiently exact to fit within the guide bushings of the stocks and dies, and at the same time give a full thread, this fact always keeping the pipe sufficiently near the standard to be practical. But with fittings, more especially cast-iron ones, the only thing which can be said to be standard about them is the thread, and it is not standard with many makers, except in so far as the diameter at the outer edge of the thread is concerned—the rest of the thread being parallel. When the cast-iron fitting was first made—wrought iron, brass and malleable iron being previously in general use—it was supposed, from the generally considered pliable nature of the metal, that the fittings would be easily broken; hence sizes and proportions were adopted which were positively ample, and which later experience proved to be heavier than was actually necessary for ordinary purposes. This led to a reduction to sizes and shapes, which, though different manufacturers varied somewhat, were, and are now, pronounced "good fittings"—meaning that they were sufficiently heavy, so as not to split with ordinary manipulation, and called for no anxiety on the part of the workman about the permanency of his construction. But these fittings, when at their best, were alike only in their nominal distinction, their length and radii being as various as there were manufacturers, and not infrequently different patterns by the same maker were in the market.

Gradually, as the manufacture became more important, prices which at first gave an ample profit, and which called for no retrenchment on the part of the maker, were reduced by those who were eager to increase their sales, and who, as long as they put an equally good fitting on the market, were perfectly justified by the laws of trade. But the result was as should be expected with a commodity that had no standard quality. Manufacturers—some of them against their judgment—began to lighten their fittings, so as to be able to meet the market at a profit. The general result was as light a fitting as would possibly stand screwing up, leaving no factor for safety. But this was not all. Fittings had to weigh less still to make a profit on them, and as they had reached the minimum in thickness, they had to be shortened in radius—in what is called "the length from the center," the length of the "hub," and the length of the inside of the hub in which the thread is cut—until the inside thread of a fitting is shorter than the length of an ordinary thread on a pipe, allowing the end of the pipe to screw past the thread in the fitting. In fact, the fitting may be said to have reached the ultimate degree of attenuation and stunting it will bear. The use of the "straight tap" is also to be condemned. With fittings of certain sizes (below 2) it is found that they can be molded and cast sufficiently accurate, so that they can be tapped without reaming; but it has also been found that the "skim" of the casting spoils a tap rapidly. This led to the use of a long tap with parallel sides, which can be ground backward from the point—the point always forming a reamer below the first tooth of the tap—and as the tap is fed to its work by a lead screw of corresponding pitch, it can be forced into the fitting. The reason why fittings should not be threaded with a parallel tap is obvious, and requires no further comment from me; but I will say, another inducement to use the "straight tap" is the decreased power necessary to operate it.

The objections to present fittings may be summed up as follows: 1. The greater part of them are too light. 2. The radius is frequently too short. 3. Elbows, tees and crosses of the same maker have generally not the same length from ends to centers. 4. Fittings of the same denomination from different makers do not agree in length and radius. 5. Many fittings are tapped straight. 6. Inaccuracy in the shape and taper of threads. 7. A tee or cross will not go in where an elbow came out without changing the length of the pipes. 8. Tees of a given prime denomination have not the same length. 9. Crosses of a given prime denomination have not always the same length. 10. Tees and crosses, in their secondary denominations, have not the same length from centers to ends of branches for the same primary denominations, nor do tees and crosses agree with each other. 11. A reducing elbow has not the same measurements as a reducing tee of the same general denomination. 12. There is no simple method by which a person cutting pipes can always find what he has to allow when he is given center measurements, if he has not the fittings in his possession.*

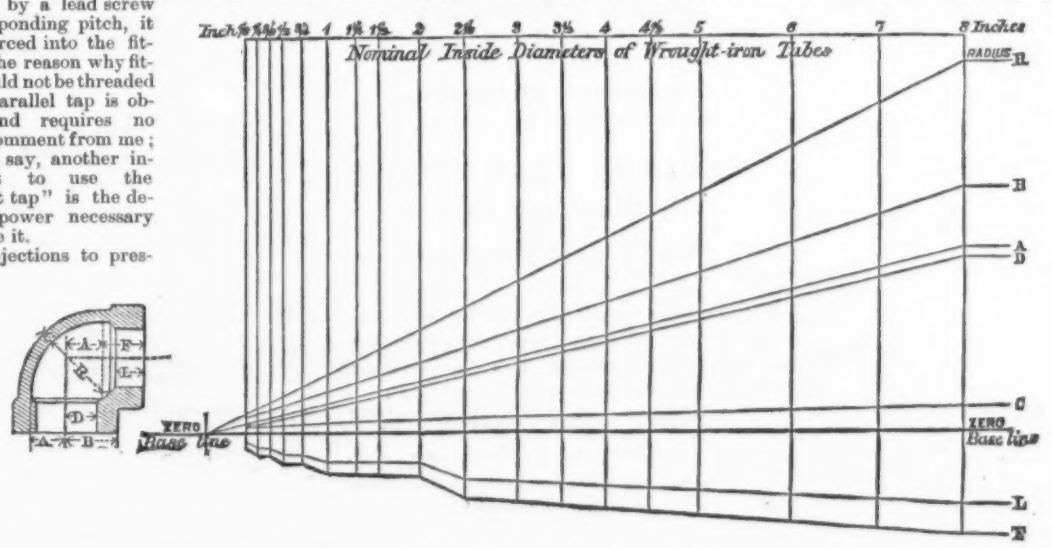
RECOMMENDATIONS FOR STANDARD FITTINGS.

1. That a minimum thickness of metal be established for the different parts of a fitting, according to its prime denomination, above which makers may go if they desire, but below which the fitting will not be standard. 2. That the radius of a fitting be fixed, and that it shall bear some common relation to the diameter of the pipe. 3. That elbows, tees and crosses of the same prime denomination shall have the same lengths from centers to ends of hubs. 4. That the length of a fitting from its center to the end of the hub bears some common relation to the diameter of the pipe. 5. That a standard fitting must have a standard weight, below which it must not go. 6. That all fittings be tapped with a taper thread of 1 in 32 to the axis of the openings—$\frac{1}{16}$ inch to 1 inch in length of thread—and that the present established method, which is not accurate, though capable of maintaining a practical uniformity in diameters, be retained until such time as methods founded on the standard-gauge system be adopted. 7. That a minimum length of thread be established for fittings in proportion to the size of the pipe, below which they will not be standard.

The use of scales for fitting and valve making—one for elbows and tees—was due to Robert Briggs, and is seen in the accompanying cut. His practice was to have these scales engraved or heavily scratched on brass or copper plates, from which the dimensions of fittings of any desired size could be taken at once with the dividers by the pattern-maker, without tedious calculation, and without having to furnish him with working drawings, and preventing a possibility of change in dimensions or design. The explanation of the scale I will give in his own words, namely:

"In regard to the construction of the scale shown in the diagram, the ordinates, though here headed for convenience with the nominal inside diameters of the tubes, are spaced from the zero point at horizontal distances (half full size) equal to the actual outside diameters of wrought-iron pipe. Of the slant lines, only two pass through the origin or zero point—namely, the line for the internal radius R of the back of the elbow, and the line giving the dimension A, which is exactly half the radius R. Of the remaining lines, those giving the three dimensions B, D, C, intersect the base line a little to the left of the origin or zero point, which means that each of the three dimensions given by these lines contains some small increment in excess of the dimensions that would be strictly proportional. For instance, with regard to the thickness C at the back of the elbow, it is evident that, if the metal in any casting, whether small or large, thin or thick, were truly homogeneous throughout both its skin and its interior portion, this thickness should then be strictly proportional to the diameter or radius of the bore, but for small castings a certain allowance of extra thickness is needed in order to insure soundness, as well as to compensate for the increased brittleness of thin cast iron. There will, however, be some size of fitting for which the normal strength of metal may safely be assumed, and for which, therefore, no extra thickness will be needed. On this assumption the thickness for the largest size is set out at the end of the scale furthest from the origin, while nearest to the origin is set out the thickness proper for the smallest size, in which the increment is at its maximum, and the slanting straight line drawn between these two extremes gives for intermediate sizes an increment which varies inversely as the diameter or radius. Needlessly complicated formulæ, involving higher or lower powers of the diameter, are thus replaced by the simple straight line. In the two bottom lines L and F, pertaining to the screwed portions of the fitting, which are a function of the pitch, the irregularities of slope are due to the fact, already commented upon, that the pitch of the screw thread for different diameters of tube proceeds by a medley of arbitrary jumps, instead of by a steady progression concordant with that of the tube diameter.

Similar scales furnish dimensions for valves and other fittings, but as the question under consideration—elbows, tees and crosses—is fully covered by this scale, if the fittings are to be made of a uniform length, they need not be considered now. It should be noticed that the distance from F to A establishes the length of the fitting from center to end of hub—the first consideration in a standard fitting—while from the base line to L establishes the length of the thread, C giving the thickness of the shell of the fitting, and the difference between D and B determining the thickness of the hub. [At the meeting full-sized drawings (1", 2", 3", 6" and 8") made by this scale were exhibited.] The questions to be determined are: Are these sizes suitable; or, if not, what is suitable? Is the thickness C too great for large sizes, and is the difference between D and B great enough for the 1-inch elbow? and kindred questions, and determine a new position for the ordinates. The reason why I introduced this scale to the notice of the society is, should a committee undertake to establish standards for fitting they will meet with both opposition and welcome from manufacturers, some of whom may be anxious their method should be adopted, though subject to modification in dimensions. But even should a method be found in use equal to the one here described, the fact of adopting it or making it a basis of the standard would be a probable cause of dissatisfaction to those in the business, and perhaps be the means of making a committee's work abortive. This is why I select the method of an engineer who is no longer among us, and to whose memory and engineering skill we will raise a tablet more lasting than a monument.



Standard Cast-Iron Fittings.—Diagram Illustrating Use of Scales for Elbows and Tees, Adapted by the Late Robert Briggs.

* Read at the Cleveland Meeting of the American Society of Mechanical Engineers.

* It should be here explained, for those not versed in the technicalities of the fitting trade, that in calling or denominating a fitting, the way a fluid will flow for distribution must be borne in mind, and the sizes of openings given in the order of their magnitude, commencing with the greatest and going straight through the fitting in the direction of the flow first. The largest opening of a fitting is the prime denomination, with a single exception in what is called a "bull-headed tee," one whose side branch, or opening, is the largest, when the smaller sizes in a direct line are mentioned first.

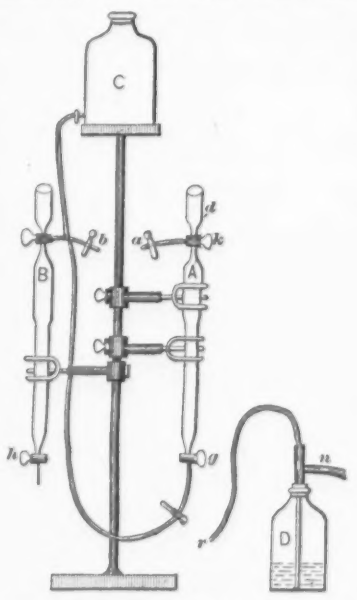
The wire rope which is to draw the cars on the north railway of the Brooklyn Bridge was put in position a few days ago. One of the switch locomotives took an end of the rope in tow at the Brooklyn tower and started very slowly for the New York side. As the rope was paid out it ran very nicely in the grooved bed wheels. The locomotive was an hour in crossing. When the rope was drawn taut it was found that many of the bed wheels were out of line. The sleepers had shifted. The engine was run back to Brooklyn, and the rope was left on the track. Men were put to work replacing the sleepers. The cable will move westward on the north track and eastward on the south track. The locomotives are to switch the cars at each end.

METALLURGICAL NOTES.

Apparatus for the Analysis of Furnace Gases.

The apparatus shown in the accompanying engraving, for which we are indebted to the *Chemical News*, enables an operator with even a small amount of manipulative skill to ascertain the condition of the gaseous contents of the furnaces under his control. The oxygen, hydrogen, carbonic acid, carbonic oxide and nitrogen may be separated and estimated in a comparatively short space of time and with sufficient accuracy to insure a satisfactory result. As shown in the engraving, the apparatus consists of two burettes, A and B, fitted with three-way stop-cocks, and each graduated in fifths of a cubic centimeter. Each burette is capable of holding about 110 c. cm. A 1-gallon tabulated bottle, C, serves as a water reservoir, while D is a suction bottle used for rarifying the gas subsequent to the introduction of reagents. The burette A is first filled with water up to the stop-cock by connection with C, the funnel *d* being also nearly filled. The bottle C is then disconnected from A and connection established between A and D. The gas to be examined is now allowed to flow in at *a*, the water flowing from A to D until the former is nearly empty. Connection is now re-established with C, and water is allowed to enter until the bottom graduation is reached. The stop-cock *k* is now carefully turned in order to allow a portion of the gas (which, of course, is under pressure) to escape through the water in the funnel *d*, until there remain exactly 100 c. cm. of gas at the normal atmospheric pressure. The apparatus is now under the proper conditions for analysis of the mixed gases.

In order to determine the proportion of carbonic acid in the mixture, the tube *r* of the suction burette is connected with the bottom of the burette, suction is applied at *n*, the stop-cock *g* is turned and all the water allowed to run out; *z* is then closed and *r* removed. A solusion of caustic potash is now applied, and, *g* being opened, a quantity of the fluid enters; the burette is now taken from its support, the hand of the operator being placed firmly on *d*, and the gas is well shaken up with the liquid, this operation



Apparatus for the Analysis of Furnace Gases.

being again performed if absorption is found not to be complete. When this is effected, the stop-cock at *k* is opened and water allowed to flow down until the normal atmospheric pressure is reached, indicated, of course, by the water ceasing to flow. The amount absorbed by the caustic potash is now read off = percentage of CO_2.

The oxygen is determined by drawing off the caustic potash solution by means of the suction tube and applying an alkaline solution of pyrogallic acid in a manner similar to that adopted in estimating the CO_2. If oxygen be present, the solution immediately becomes black and the diminution in volume, after shaking as before, and reducing to normal pressure, gives the percentage of oxygen.

In determining the carbonic oxide we proceed as follows: If oxygen has been proved to be present, carbonic oxide will most likely be absent, unless the gases have been brought together at a temperature insufficient to promote their combination. In order to effect the estimation of carbonic oxide by absorption, it is necessary to remove every trace of the alkaline pyrogallate solution by the use of the funnel *d* and the suction bottle; this done, a concentrated solution of cuprous chloride in hydrochloric acid is applied to the bottom of the burette as before; when absorption is complete, the cuprous chloride is drawn off, and the tube washed and treated with a solution of caustic potash, for the purpose of absorbing any hydrochloric acid vapor which may have been liberated in the reaction; after bringing to correct pressure, the reading shows percentage of carbonic oxide. Carbonic oxide and hydrogen are, however, generally estimated by combustion, as follows: The gas is allowed to mix with atmospheric air by turning the cock *k*, and momentarily releasing the pinch-tap, the water being permitted to flow out at *g*; normal pressure is then re-established by means of the funnel *d*, and a reading taken. Connection is now made between *a* and *b*, uniting the two by means of a piece of hard glass combustion tubing containing a small coil of palladium wire. Burette B is now filled with water by connection with C. The palladium wire in the tube is brought to a red heat by means of a Bunsen burner, and the gas is caused to pass from A over the heated tube into B by opening *h* and *g*, connecting the reservoir water supply C with bottom of burette A. When all the gas has passed over, the operation is reversed, the gas being again collected in A. It is allowed to stand until the normal temperature is attained, adjusted for pressure and read off.

It might perhaps be considered advisable to notice here what has taken place in the combustion. The gases remaining in the mixture are hydrogen, carbonic oxide and nitrogen; by the admixture of air, and passage over the red-hot palladium coil, the oxygen of the air combines with the carbonic oxide (CO) to form carbonic anhydride (CO_2), and with the hydrogen to form water, the nitrogen, of course, remaining unacted upon. If the gas under examination consists entirely of hydrogen and nitrogen, it is obvious that the diminution in bulk multiplied by two-thirds gives at once the percentage of the former gas; *e. g.*, supposing there to be present 10 c. cm. of hydrogen, and 8 c. cm. of nitrogen, and 22 c. cm. of air have been admitted, the whole therefore measuring 40 c. cm., after combustion the measurement of the gas is found to be 25 c. cm., showing loss in bulk of 15 c. cm., which diminution is due to the combination of 10 volumes of hydrogen with 5 volumes of oxygen, to form 15 volumes of water (which latter occupies no appreciable space and may therefore be neglected), consequently $15 \times \frac{2}{3} = 10$ c. cm. equal volume of hydrogen. If carbonic oxide, hydrogen and nitrogen be present the calculation is still almost as simple. Supposing, for example, that the following mixture be contained in the burette:

	C. cm.
Carbonic oxide	10
Nitrogen	12
Hydrogen	8

50 c. cm. of air are admitted, the whole measuring 80 c. cm. After combustion it is found that measurement is reduced to 80 — 63 = 17 c. cm. The 63 c. cm. of gases being now submitted to the action of caustic potash solution in the usual manner, the carbonic anhydride produced in the reaction is thereby absorbed and a further diminution of 10 c. cm. is observed, which indicates the percentage of carbonic oxide present, since for every volume of carbonic oxide burnt an equal volume of carbonic anhydride is formed; and since also that this 10 c. cm. of CO must have consumed half its volume, or 5 c. cm. of oxygen, we obtain $(17 - 5) \times \frac{2}{3} = 8$ c. cm. of hydrogen, nitrogen being then calculated by difference.

The Pittsburgh Exposition.—Pittsburgh reports announce that even at this early date, and notwithstanding the fact that the blank applications have not yet been issued, the managers of the Exposition Society are daily receiving inquiries for space in the coming show. Merchants and manufacturers are manifesting a greater interest than has been exhibited for several years, and from the outlook it is fair to presume that there will be no lack of attractions or novel display. Among the attractions already secured are several from the recent Chicago Exposition, one of which is the locomotive "Arabian," one of the oldest in the United States, with a history that will make it a very interesting feature. A beautiful model of the Woodruff sleeping car, and the handsomest street car ever turned out of the John Stevenson car shops, of New York, will also be on exhibition. Among the new features will be that of the "Old Curiosity Shop," which will contain a number of old pictures pertaining to the early history of Pennsylvania, and especially of Pittsburgh. There will be a relic department, which will contain such articles of interest as may be loaned to the society, for which no entrance fee will be charged, and the safe keeping and return guaranteed by the management. One of the first cannon mounted at Old Fort Duquesne will also be on exhibition.

The Illinois Legislature has passed a bill requiring railway companies to pack all frogs and switches with wooden blocks in such a way as to prevent men from catching their feet in them. The Legislatures of some other States and of the Province of Ontario have also passed similar laws, and many railway companies have taken this precaution voluntarily. While there is some little danger of derailment by filling up the angles for frogs and switches, the danger to train men by leaving them open is so great, as has been proved by innumerable terrible accidents, that the railways should cheerfully anticipate the action of Legislatures in this matter.

The difference in price per ton between Bessemer pig and basic pig iron in Germany is given as $2.38, Bessemer pig selling at $14.51 and basic pig at $12.13.

Special Notices.

LATE PUBLICATIONS.

Burnham, S. M.—History and Uses of Limestones and Marbles. 48 chromo-lithographs, 392 pages, 8vo, cloth; 1883 . . . . . $6

This work considers the localities and characteristics of the different limestones and marbles, not only of the United States, but also of different countries. The book is the only one published on the subject, we believe, and shows great care on the part of the author in classification and arrangement. The use of colored plates, showing different marbles, adds value to the work. The subject of antique marbles and stones, as applied to decoration and art, is also included.

Box, Thomas.—Strength of Materials. 27 plates and upward of 150 tables, 525 pages, 8vo, cloth; 1883 . . . . . $7.25

In his preface to this valuable addition to engineering text-books, the author states that two special objects have been kept in view: First, that the rules and data shall be correct and trustworthy, and, second, that their application to practice shall be clearly understood. These objects have been attained, and the subjects of tensile, compressive, transverse and other strains to which bodies are subjected are clearly presented without difficult mathematical formulæ. Numerous tables, giving the strengths of different materials used in engineering works, add greatly to the value of the book.

Greer, Henry.—Recent Wonders in Electricity, Electric Lighting, Magnetism, Telegraphing, &c. Illustrated, 8vo, paper; 1883 . $2

This collection of essays includes articles by Dr. Siemens, Count du Moncel and Professor Thomson, and contains illustrated descriptions of the latest achievements in the art. Among other interesting experiments of which accounts are given is the method of taking photographs by the electric light.

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The two blocks of property formerly occupied by the Ransom Stove Works will be sold under foreclosure, separately or together, on August 1st, at Albany, N. Y. These premises are admirably adapted to manufacturing and foundry purposes, and have unsurpassed shipping facilities, both by rail and by boat. For particulars, address
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A man of 20 years' experience as Manager of Coke and Raw Coal Furnaces desires a position. Has had experience with all native and foreign ores. Refers to F. D. Norton, Belfont Iron Works Co., Ironton, Ohio, and Col. Douglas Putnam, General Superintendent, Ashland, Ky.
Address THOS. L. HOUGHTON,
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CORRESPONDENCE IS SOLICITED

with parties having

MACHINERY TO BUILD,

Heavy work preferred.

Address
THE HARTFORD ENGINEERING CO.,
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Wanted.

To purchase a light Locomotive, 3 feet guage, to run on a 16 lb. rail Lumber Road.

Address
BROOKS BROS.,
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or, S. B. LOWE,
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Wanted.

To exchange Topeka Real Estate for Hardware.
Address H. N. CASTLE,
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AN EXPERIENCED SALESMAN,

now connected with a prominent New York wholesale Hardware house, acquainted with City trade, would arrange with one or more Manufacturers to act as resident City Salesman. Address CITY TRADE,
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WANTED.

A pair of plain Rolls, with Frames or Housings, 24 in. face, 12 in. diameter. Address "ROLLS,"
Office of *The Iron Age*, 83 Reade st., New York.

Special Notices.

For Sale.

The LARGE and EXTENSIVE SHOPS, MACHINERY and TOOLS of the Gibbs & Sterrett Mfg. Co., located in the City of Corry, Pa.

These Shops are very extensive and have a Foundry, both for Brass and Iron, attached, and have been used for the manufacture of the Climax Reaper and Mower, with a capacity to turn out 5000 Machines per year, besides doing a large business in building Steam Engines of from 10 to 80 horse-power.

Pattern, Tools and Machinery are in FIRST-CLASS ORDER, so that the works can be run right along. Such an opportunity for a company or individual to continue a good and paying business seldom offers, as the property will be sold on VERY REASONABLE TERMS AND PRICES.

The property is located at the Junction of the N. Y., P. & O. R. R. with the Buffalo, Pittsburgh & Western, and the Phila. & Erie R. R's, giving shipping facilities superior to almost any other point.

Parties desirous of examining the works will please call on Mr. T. A. ALLEN, President of the Corry National Bank, who will afford them facilities and give full information in regard to them.

I WILL ALSO SELL,

on equally reasonable terms and prices, the large and extensive SHOPS, MACHINERY and TOOLS of the Gibbs & Sterrett Mfg. Co. located in the City of Titusville, Pa. These Shops have done a large and flourishing business in the manufacture of Steam Boilers, Oil Well Drilling Tools, Iron Tanks, Heavy Forgings, and Machine Shop Work generally, and are in good order to continue such work, or any other Machine Shop Work parties may desire to do.

Parties wishing to examine these works will please call on Mr. G. C. HYDE, Cashier of the Second National Bank of Titusville, who will give them all information.

Please address communications to
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For Sale.

"ACME" BOLT CUTTERS.

6 Single Bolt Cutters, cutting from ¼ in. to 1 in.
3 Single Bolt Cutters, cutting from ⅝ in. to 1¼ in.
12 Single Bolt Cutters, cutting from ½ in. to 2½ in.
2 Single Bolt Cutters, cutting from ¾ in. to 3 in.
2 Single Bolt Cutters, cutting from ¾ in. to 2½ in.
1 Single Bolt Cutter, cutting from 1 in. to 3½ in.
6 Double Bolt Cutters, cutting from ½ in. to 1½ in.

With or without Automatic Motion.

NUT TAPPERS,

BOLT POINTERS, &c.

Specialist in All Kinds of

BOLT and NUT MACHINERY.

NOVELTY IRON WORKS,

CLEVELAND, OHIO.

New Inventions.

Patentees desirous of introducing their inventions into the English Market are requested to address their circulars, with full particulars, prices and best discounts, to

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NOTE.—All quotations must include free delivery to London or Liverpool.

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IN PRINT AND READY FOR DISTRIBUTION IN 30 DAYS,

A POCKET MANUAL FOR ENGINEERS, EDITED BY

JOHN W. HILL, Mechanical Engineer,

Member American Society of Civil Engineers;
Member American Association R. R. M. M.

EDITION TEN THOUSAND.

Of which, first 2000 copies will be furnished, postage prepaid, at one dollar ($1.00) each; subsequent copies will be furnished (postage prepaid) at one dollar and a half ($1.50) each. A pocket manual of useful information for mechanical engineers, steam users and mechanics, containing 224 pages (set in nonpariel type) of carefully selected data, formulæ and experimental investigations from the latest and most approved sources. Printed from electrotype plates, on white No. 1 book paper, in stiff morocco covers with cardinal edges. Size of page 4½ x 6¾ inches. From press of Robert Clarke & Co., Cincinnati, O. Published by **WILLIAM A. HARRIS,** Builder of Harris-Corliss Steam Engines, Providence, R. I., to whom all subscriptions for copies should be sent.

Wanted Immediately.

A FIRST-CLASS STEAM FITTER.

One accustomed to Steam Heating.

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Wanted.

A practical File Foreman to take charge of our File Department; must thoroughly understand the machinery and process of manufacturing Files in all the different departments. Correspondence solicited.

MICHIGAN SAW & FILE WORKS,
East Saginaw, Mich.

Notice.

An exceptionally well-situated site now to be had for a Merchant Bar Iron Rolling Mill, convenient in respect to railway and water facilities, with a large trade guaranteed in advance of the construction of the mill.

Apply to POST OFFICE BOX 422,
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desiring to locate where they will have cheap fuel and building material, superior shipping facilities by rail and river, affording direct communication with the rapidly growing States and Territories, combined with good social and healthful advantages, will find it to their interest to correspond with
J. W. STEWART,
President Business Men's Ass'n,
Rock Island, Ill.

A Young Man

with several years' experience in Hardware Business, and can command Four or Five Thousand Dollars, desires an interest with some Hardware Firm. References good, and communications confidential. Address D. L. RAY,
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Special Notices.

NEW AND SECOND-HAND

MACHINERY.

1 Engine Lathe, 29 in. swing, 18 ft. bed. 2d hand.
1 Screw-cutting Gap Lathe, 26 in. swing over bed, 48 in. swing over gap; bed 24 ft. long. New.
1 each Engine Lathes 26 in. swing, 10 ft., 12 ft., 14 ft., 16 ft., 20 ft., 24 ft. bed. New.
1 Engine Lathe, 23 in. swing, 16 ft. bed. 2d hand.
1 each Engine Lathes, 21 in. swing, 6 ft., 8 ft., 10 ft., 12 ft. bed. New.
1 each Engine Lathes, 20 in. swing, 6 ft., 8 ft., 10 ft., 12 ft. bed. New.
1 Engine Lathe, 20 in. swing, 8 ft. bed. 2d hand.
1 each Engine Lathes, 19 in. swing, 7 ft., 8 ft., 10 ft. bed. New.
4 Engine Lathes, 19 in. swing, 6 ft. bed. Nearly new
1 " 19 " " 7 " " 2d hand,
1 " 18 " " 6 " " New.
1 each Engine Lathes, 17 in. swing, 6 ft., 7 ft., 8 ft., 10 ft. bed. New.
1 Engine Lathe, 15 in. swing, 9 ft. bed. 2d hand.
2 " 15 " " 6 " " New.
1 " 14 " " 6 " " 2d hand.
1 " 13 " " 6 " " New.
3 " 13 " " 5 " " "
1 " 12 " " 5 " " "
1 " 11 " " 5 " " 2d hand.
1 " 11 " " 5 " " New.
1 " 10 " " 4 " " "
2 Hand Lathes, 15 in. x 5 ft. bed. New.
2 " 12 in. x 4 ft. bed. 2d hand.
1 " 12 in. x 4½ ft. bed. New.
1 " 12 in. x 4 ft. bed. New.
1 " 11¾ in. x 4 ft. bed. New.
1 " 10 in. x 3 ft. New.
6 " 10¼ in. sw., 3 x 4 ft. bed. 2d hd
5 Single Head Lathes, 13 " 4 ft. " "
1 Bench Lathe, 8¼ in. x 3 ft. bed. New.
1 Foot Lathe, 8¼ in. x 3 ft. bed. New.
1 Foot Lathe, 12 in. x 4 ft. bed. New.
1 Foot Lathe, 8 in. x 2 ft., 8 in. bed. New.
1 Turret Lathe. 2d hand. 16 in. x 5 ft. bed.
1 Planer to plane 31 in. x 30 in. x 6 ft. 2d hand.
1 Planer to plane 34 in. x 32 in. x 12 ft. 2d hand.
1 Planer to plane 27 in. x 27 in. x 7 ft. New.
1 Planer to plane 24 in. x 24 in. x 8 ft. New.
1 Planer to plane 22 in. x 22 in. x 5 ft. New.
1 Planer to plane 20 in. x 20 in. x 4 ft. New.
1 Planer 20 in. x 4½ ft. 2d hand.
2 Planers to plane 16 in. x 16 in. x 3 ft. New.
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2 Shapers, 15-in. stroke, 23-in. traverse. New.
1 Shaper, 12-in. stroke, 33-in. traverse. New.
1 Shaper, 12-in. stroke, 18-in. traverse. New.
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1 Back-geared Milling Machine. New.
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3 24-inch Up. Drills, Bk. Gr. and Self Feed. New.
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1 4-Spindle Drill Press. New.
1 3 " " " "
1 2 " " " "
7 Gang or Multiple Drills, 2, 3 and 6 spindles. 2d hand.
1 Single Spindle Light Drill, Table Feed. New.
1 Single Spindle Profiler. New.
1 Two " " Light. New.
2 Profilers. 2d hand.
2 Turret Head Chucking Machines. 2d hand.
1 Broaching Machine. 2d hand.
1 Cutting Off Machine, 2½ in. 2d hand.
1 No. 1 Screw Machine, wire feed. 2d hand.
1 Screw Machine. New.
1 " Slotter, "
1 Cutter Grinder. "
6 Emery Grinders. New.
1 Slitting or Circular Shear. New.
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1 13 ft. Bending Rolls. 2d hand.
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1 Squaring Shear, 22 in. New.
3 Hand Shears. 2d hand.
3 Power Presses. New.
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1 Screw Press. New.
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1 Drop Press, 50 lb. Hammer. 2d hand.
1 Lot Heavy Polishing Frames. 2d hand.
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1 8 x 8 Upright Engine. New.
1 10 x 12 Horizontal Stationary Engine. New.
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1 10 H. P. Cylinder Boiler. 2d hand.
1 10 H. P. Upright Boiler. New.
1 10 H. P. Upright Boiler. 2d hand.
1 No. 1 Steam Pump. 2d hand.

Wood-Working Machinery.

1 Double Saw Bench. New.
1 24-in. Surfacer Rotary Bed. New.
1 Band Sawing Machine. New.
1 Scroll " "
1 Rod Machine. Self Feed. "
1 Sandpapering Machine. 2d hand.
1 8-in. Molder, 4 sides. 2d hand.
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1 Daniels Planer. 2d hand.
1 Large Lot 2d-hand Pulleys and Hangers.
And lot of others, both new and 2d hand.

If the list does not contain what you want, write us.

J. M. BADGER & CO.,
49 DEY STREET, New York City.

For Sale.

One Standard Gauge Locomotive, just rebuilt. Cylinders, 14½ in. x 22 in.; drivers 4 feet diameter, with 2⅝ in. steel tires; new headlight, steam gauge, gauge cocks, oil cups, automatic feeders and Sellers' injector, new hose and patent hose-key coupling, tank in splendid order, new set flues in boiler. Everything in perfect working order. Boiler inspected and steam capacity guaranteed. All ready for immediate use and delivery. A great bargain. Will be sold for spot cash.

ALSO FOR SALE.

One Horizontal Poppet Valve Engine. Cylinder, 24 in. x 42 in. Just thoroughly overhauled and in good running order. With or without fly-wheel. Ready for immediate use, and practically as good as new. At a great sacrifice. For particulars and price, address at once

POPE IRON AND METAL CO.,
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E. BISSELL & CO.,

Wholesale Hardware Auctioneers,

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Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

VALUABLE PROPERTY FOR SALE.

The Hardware Works, Tenth and Spruce Streets, Reading, Pa., consisting of Foundry, Machine Shops, Warehouse, and other buildings, machinery, etc., all in first class running order. One entire block of ground. Ample room for extension. Will be sold on easy terms. Apply to
F. C. SMINK,
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WANTED.—A permanent position as Manager, Superintendent or Designer and Draftsman by an energetic man who knows his business and scientifically educated, with long, practical experience in originating all kinds of new machinery, both light and heavy, and boilers, estimating their cost and price, and superintending their construction, and the management of help.
Address "F,"
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Special Notices.

New & Second-Hand Machinery.

FEB. 21, 1883.

1 Engine Lathe, 14 in. x 5, 6, 7 and 8 ft. Grant & Bogert.
1 " " 26 in. x 12 ft., Grant & Bogert. New.
1 " " 48 in. x 15 ft. Good order.
1 " " 36 in. x 12, 17 ft. New.
1 " " 42 in. x 14 ft. New.
1 " " 14 in. x 6 ft. Star Tool Co. New.
1 " " 18 in. x 6 ft. New.
1 " " 14 in. x 5 x 6 ft. New.
1 " " 16 in. x 7 ft. Bridgeport. New.
1 " " 13 in. x 5 ft. and 6 ft. Ames. New.
1 " " 16 in. x 6, 7 and 8 ft. Ames. New.
1 " " 18 in. x 8 and 10 ft. Lodge & Barker. New
1 " " 27 in. x 10 in. Lodge & Barker.
1 " " 22 in. x 12 ft. New.
1 " " 20 in. x 10 ft. New.
1 " " 28 in. x 16 ft. New.
1 " " 24 in. x 12, 14 and 16 ft. New.
1 " " 11 in. x 4 ft. and 5 ft. Prentiss. New
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1 Plain Engine Lathe, 16 in. x 4 ft. New.
1 " " 15 in. x 4 ft. New.
1 Fox Lathe, 15 in. x 5 ft. Am. Tool & Machine Co.
1 15 in. x 4 ft. Turret Lathe. Lodge & Barker.
1 Fox Turret Lathe, 16 in. x 6 ft. Lodge & Barker. New
1 Planer, 50 in. x 50 in. x 17 ft. Good order.
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1 " 16 in. x 16 in. x 3 ft. New.
1 " 22 in. x 20 in. x 5 ft. New.
1 " 24 in. x 24 in. x 6 ft. Hendey. New
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1 " 16 in. Lever Table Drill. New.
1 Crank Planer, 16 in. x 16 in. x 13 in. New.
1 16-in. Upright Drill. New.
1 20-in. " Prentiss. New.
1 24-in. " Prentiss. New.
1 30 in. " Prentiss. New.
1 25-in. swing B. G. & B. F. Drill. Blaisdell. New
1 28-in. " " " " " "
1 38 in. swing, B. G. & T. F. Drill. New.
1 14-in. Shaper. Gould & Eberhardt. New.
1 10-in. Shaper. Gould & Eberhardt. New.
1 15-in. Shaper. Hendey. New.
1 24 in. Shaper. Hendey. New.
1 24-in. Shaper. Hendey. Good order.
1 9-in. Shaper. Hewes & Phillips. New.
1 9-in. Shaper. New.
1 14-in. Shaper.
Full Assortment of Milling Machines, Spindle Drills, &c., of Garvin's. New. [& Lamson.
1 each Nos. 2 and 4 Screw Machines, Wire Feed. Jones
2 No. 2 Lincoln Millers. Good order.
2 No. 2 Lincoln Millers. New.
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1 Boring and Turning Mill, 50 in. New.
1 Boring and Turning Mill, 72 in., 2 Heads. New.
1 each 3 and 7 spindle Nut Tappers. New.
1 Gig Saw. Good as new. Rogers.
1 700-lb. Steam Hammer. Ferris & Miles. Good order

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Established 1873. Gardner Bros "Standard Savage" Fire Brick Works, situated at Ellerslie Station, Md., on Baltimore and Ohio R. R. Also on Bedford Branch of P. R. R. Has convenient shipping arrangements on both roads. Works consist of two independent plants of machinery, so constructed and arranged that they can be run separately or together. One of the buildings entirely new, erected last year. Capacity of works, over 14,000 bricks per day. Mount Savage clay in abundance, mined on royalty, and delivered direct into works by gravity. Inclined plane and tram road, large portion of which was laid with new Tee rail last year. New artesian well, capacity over 35 barrels per hour. Also mountain stream, delivering water by gravity into tanks at works. Seven acres of land, with nine good tenements. Everything in first-class order for manufacturing and shipping brick direct from kilns into cars. Good and growing trade established. Brick unquestionably as good as the best made of Mount Savage clay. Statements of business done will be shown to responsible parties desirous of purchasing. Our good will and influence to go with sale. Any further information desired will be cheerfully given by

GARDNER BROS.,
Lockport, Pa.

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Established in 1864. Gardner Bros.' Gas Retort and Fire Brick Works, situated at Lockport Station, on P. R. R., 60 miles from Pittsburgh, Pa. The works consist of complete plant for manufacturing Clay Gas Retorts, Settings, Blocks, Tile and Fire Brick. Capacity, about 100 retorts, with necessary settings, and 100,000 fire brick per month. Clay and coal mined by ourselves within short distance of works and hauled in wagons. Over three acres of land, with all necessary buildings, a number of tenements and town lots, P. R. R. has side track alongside our kilns. Good trade established. Our good will and influence to go with sale. Statement of business done will be shown to responsible parties desirous of purchasing. Any further information desired will be cheerfully given by

GARDNER BROS.,
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For Sale.

The Industrial Works of Shamokin, owned and successfully carried on for a number of years by the late Wm. Brown, deceased, consisting of Foundry and Machine Shop, and a large stock of Patterns regarded as part of the property. Boiler Shop, Blacksmith Shop and Factory for the manufacture of heavy coal screens. Well located in the borough of Shamokin, Pa., with the best facilities for shipping by rail, and surrounded by a district contributing all the work that a shop of that kind can possibly turn out. Easy terms of payment are offered to suit a purchaser of limited capital. For list of Tools and further particulars apply to
WM. McILVAIN & SONS,
Manufacturers of Boiler Plate and Tank Iron,
Reading, Pa.

For Sale.

	Weight, lbs.
One Lot Old Iron Rails	10,725
do. Condemned Iron (new)	180,498
do. Large Billets	6,550
do. Small Billets	18,456
do. Cobbles	5,391
do. Short Pieces Puddle Bars	30,391
do. Finished Iron Ends	43,660
do. Tool Iron	3,996
do. Scrap Billets	18,947
do. Puddle Billets	7,602
do. Scrap Iron	105,498
do. 2⅛, 2¾, 3, 3⅛, 4, 5 and 6 in. Scrap Bars.	
do. 2½, 3½, 4, 5 and 6 in. Puddle Bars.	

For terms and particulars apply to

JOS. J. LIPPINCOTT & CO.,
131 So. Fourth St., Philadelphia, Pa.

FOR SALE.

No. 6 Baker Blower, Nos. 4 and 6 Sturtevant Blower, No. 6 McKinzie Blower; Cupola, 48 inches; Crane, 15 tons; 2, 4, 6 and 10 H.-P. Baxter Engines; Planer, 20 x 16 x 4 ft., $250; do., old style, 29 x 29 x 5, $200; Engine Lathe, 30 in. x 14 ft., $350, &c.
Purchases of new and second-hand machinery carefully made, at low rates, for parties out of the city. C. R. BIGELOW, M. E.,
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For Sale.

Stock of General Hardware, Stoves and Tinware, and good-will of the business without bonus. Stock will inventory thirteen to fifteen thousand. Business located in a growing town of about 9000 inhabitants, in Northwestern Pennsylvania, and a railroad center. For further information, address
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A Stock of Hardware in a good location and a good trade in Omaha, Neb. The best opening in the West for Retail Hardware Business. Stock worth about $6000. Will invoice stock and give time for goods. Reason for selling, health wont permit.
Address "HARDWARE,"
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Special Notices.

FIRST-CLASS PAYING BUSINESS For Sale.

Parties having built up and thoroughly established an extensive and fine paying business, will sell the same, including several fine machinery specialties in iron and wood, and a jobbing business of every class of Gearing, Shafting, &c., and Foundry and Woodwork. Specialties have but little competition and are easily managed. The jobbing business includes a very fine collection of patterns in constant use, and controlling a very large jobbing trade. Also Machinery, Tools, Stock, &c., and good will.

Above business is constantly growing, and has every year cleared **a very large amount of money.** Is centrally located and upon a large and never-failing water power, with canal through premises and excellent railroad facilities. The reason for owners offering same is because the business has grown too large for present buildings and facilities and is contantly growing, and they desire to remove one specialty, for which they have lately secured letters patent and requiring special buildings and machinery, to the center of its market in the West, which will relieve sufficiently the present facilities now overcrowded. Or should any parties desire, we will sell the specialty and retain the other business.

The straightforwardness of above facts can be readily ascertained.

Any young man or old business men having money will find either business a very pleasant and profitable one. To save annoyance or trouble, we will answer inquiries only from parties with commercial standing or who are vouched for by bankers or other responsible parties. Would prefer parties with means, interested and looking for an established, paying business, to call personally upon us with proper letters and introductions.

E. W. ROSS & CO.,
Fulton, N Y.

To Brass Foundries.

To Brass Manufacturers.

Our new foot press, for cutting off GATES from brass castings by FOOT power, is now ready. Weight, 250 lbs. Price complete, **$50,** net. A boy can operate it easily. We warrant them to give the most perfect satisfaction. PEERLESS PUNCH AND SHEAR CO.,
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For Sale or Lease.

A Large Two-Story Brick Factory,

formerly Machine Works, at Pearl River, N. Y., on railroad depot, 25 miles from New York City, Railroad facilities unexceptionable, on the line of the New Jersey and New York Railroad. The property contains 40,000 square feet floor space, with one 80 H. P. Engine and Boiler, 700 ft. 2-inch line shafting and water pipes throughout the building. A splendid iron foundry, 70 ft. by 90 ft., with one iron smelting cupola with Mackenzie blower, brass furnace, core oven, blacksmith shop, pattern vaults, annealing oven, etc. The property can be bought or leased on liberal terms. For further particulars, price, terms, etc., address

J. E. B. & Co.,
113 Liberty st., New York City,
or Pearl River, Rockland Co., N. Y.

For Sale.

The largest stock of New and Second-hand Engines, Boilers, and general Machinery in the West. Send for Catalogue. Hoisting Outfits for Coal Mining and other purposes a specialty.

WARREN SPRINGER,
195 to 219 South Canal St., Chicago.

For Sale.

Second-hand

DROPS and LIFTERS.

BEECHER & PECK,
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For Sale.

New Machine Tools, &c.

16 in. x 6 ft. Engine Lathe, with 6 in. chuck	$300
18 in. x 8 ft. Engine Lathe, power cross feed	350
20 in. x 10 ft. Engine Lathe, power cross feed	475
24 in. x 12 ft. Engine Lathe, power cross feed	624
26 in. x 16 ft. Engine Lathe, power cross feed	740
30 in. x 16 ft. Engine Lathe, power cross feed and compound rest	850
27 in. x 27 ft. x Planer. A fine tool	675
30 in. x 28 ft. x Planer. A fine tool	850
14 in. Circular Base Graduated Planer Chuck	25
18 in. Square Base Planer Chuck. Very heavy	25
28 in. Upright Drill, back geared	210
20 in. Upright Drill, new design	100
Nut Tapper, capacity 12,000 ¼ in. nuts per day	125
Chapin Header for ¼-in. to ⅝ in. Carriage Bolts	350
Punch Press and Shear, small size	25
Punch Press and Shear, large size	60

All the above tools are new and are warranted first-class in every respect.

AMERICAN TOOL CO., Cleveland, Ohio.

For Sale.

TREBLE AND DOUBLE-GEARED 25-INCH ENGINE LATHE,

from new patterns.

GEORGE A. OHL & CO.,
East Newark, N. J.

STEAM PUMPS For Sale.

A large number of Steam Pumps of all makes, and ranging in size from small tank or boiler feeds up to very heavy service machines.

While the stock lasts good bargains are open for Miners, Water Works, Rolling Mills, Furnaces, or any one needing to move fluids by steam.

Call upon or address
JNO. A. HINCKLEY,
Purchasing Agent of the United Pipe Lines,
Oil City, Pa.

Wanted.

A Partner with $5000 to $10,000 in a Foundry and Machine Business, established in 1824. For particulars, inquire of

I. H. COLLER,
Poughkeepsie, N. Y.

Wanted.

An old-established firm in Thames street, manufacturing specially one description of Ornamental Castings, but having warehouse too large for own use, are desirous to meet with manufacturers of other goods requiring them stocked in London and sold on commission. Apply to
203/30, care of Ironmonger Newspaper,
42 Cannon street, London, England.

24-INCH LATHES FOR SALE.

2 24 inch x 9 ft. Lathes	$400
2 24 inch x 12 ft. Lathes	500

First-class, and warranted accurate.

B. GRAVES LOUDEN,
22d st. and Washington ave.,
Philadelphia.

Special Notices.

HENRY I. SNELL,

135 North Third St., Philadelphia, Pa.,

has just received a fresh lot of Machine Tools, Engines, &c., which he offers at very low figures.

One Screw-cutting Lathe, 6 ft. bed, 18 in. swing.
One Screw-cutting Lathe, 8 ft. bed, 18 in. swing.
One Screw-cutting Lathe, 18 ft. bed, 28 in. swing.
One Iron Planer, made by Betts, 13 ft. long 38 in. wide.
One Power Crank Planer, 12 in. stroke.
One 11 in. Shaping Machine, traveling head.
One 38 in. Upright Drill. Extra heavy. New.
One 200 lb. Ferris & Miles Steam Hammer.
One 40 H. P. Corliss Engine.
One 26 in. Heavy Endless Bed Surfacer.
One 60 H. P. Locomotive Boiler.
One R. Ball & Co. Planer and Matcher.
One Rogers Planer and Matcher.
One J. A. Fay & Co. Planer and Matcher.
One Smith 8-inch Moulding Machine.

For Sale.

Palo Alto Rolling Mills,

Near Pottsville, Pa.,

ON THE MAIN LINE OF THE POTTSVILLE AND READING RAILROAD.

These mills are in good repair, and can be started in two days' time.

Rolls for T-Rails 12 to 70 lbs. per yard, and for Street Rails 18 to 70 lbs. per yard.

Guide Mill Train for Merchant Iron ¼ to 1 inch.

Rolls for Merchant Bar, round and square, up to 4½ inches.

Number of Puddling Furnaces in both mills, 30; Heating Furnaces, 9; all with boilers attached.

Also Foundry, Machine Shop, Blacksmith Shops, Iron House, Roll House, Carpenter and Pattern Shops, Stables, handsome Dwelling for Superintendent, 11 Tenement Houses, a Brick Office, and ample grounds for stock and cinder.

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Messrs. LEE & McCAMANT, Extrs.,
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THOS. F. WRIGHT, 1804 Race St., Philadelphia, Pa.
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For Sale.

Bolt and Nut Machinery.

9 Bolt Cutters, National, capacity up to 1 in.
10 Bolt Cutters, National, capacity up to 1¼ in.
6 Bolt Cutters, National, capacity up to 1⅝ in.
3 Bolt Cutters, National, capacity up to 2 in.
3 Bolt Cutters, National, capacity up to 2½ in.; 2 each, 3 in. and 4 in.
2 National Bolt Headers, capacity up to 1 in.
1 National Bolt Header, 1½ in.
1 Improved Lewis Bolt Header, capacity up to 1½ in.

Several Chapin Headers, light and heavy; Nut Tappers, a complete assortment; Cold Headers for Rivets, Store Bolts, &c.; Hot-pressed Nut Machines, 3 sizes; Washer Machinery, and every variety of tool used in Bolt and Nut Shops. The only specialists in line in the United States.

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THE NATIONAL MACHINERY CO.,
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Catalogues sent free to any address.

For Sale.

MACHINES FOR MAKING PICKS, MATTOCKS AND AXES,

With **Solid Punched** or **Adze Eyes.**

T. & CO., Box 25,

Office of *The Iron Age*, 83 Reade st., New York.

For Sale.

1 Train, Lauth's, 3-high rolls, 22-inch.
1 Train, 2-high rolls, 22-inch.
1 Train, 2-high soft rolls, 20-inch.
1 Train, compound, 2-high muck rolls, 18-inch.
1 Roll Turning Lathe.
1 Large Engine, 22 in. x 32 in.
4 Large Boilers, fire-box 28 ft. x 48 in. Good as new.
4 Medium Boilers, 24 ft. x 42 in.
1 Large Squeezer, 1 Large Pump, 1 Plate Shear, 1 Sheet Shear, 1 Muck Shear, 2 Scrap Shears, Castings for four Charcoal Fires, Fans, Tools, Patterns, Scales, &c.

Will be sold together, or separate, very cheap. Easy terms to responsible parties.

Address **H. W. W.,**
130 Dearborn St., Rooms 14 and 16,
Chicago, Ill.

FOR SALE.

One 10-in. Train, consisting of 1 set Pinion Stands and Pinions; 3 sets Large Stands; 1 set Finishing Stands; 1 set 3-high Roughing Rolls, 10 in. x 42 in.; 1 set 3-high 2nd Roughing Rolls, 10 in. x 30 in., chilled; 1 set Oval Rolls, chilled; 1 set Finishing (Rounds) Rolls, chilled. Coupling Boxes, Spindles, Chucks—complete Train, with all the latest improvements. For prices, &c., apply to

EDWARD GOUGH,
Phenix Chilled Roll Works, Allentown Pa.

CORNELL UNIVERSITY.

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Mechanical Engineering,
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ENTRANCE EXAMINATIONS BEGIN AT 9 A. M., JUNE 18 and SEPT. 18, 1883.

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Wanted.

Guide and Hoop Roller, and Heater for 8 in. Train; Roller, Catcher and Heater for 15 in. Bar Train. Must be first-class workmen and non-union men. Best reference required.

Address "W. R.,"
Office of *The Iron Age*, 83 Reade St., New York.

TO ENGLISH AND CANADIAN MANUFACTURERS.

Wanted.—To arrange with some party to manufacture on royalty, or to buy outright, English Patent No. 4929, for Friction Clutch; also Canadian Patent No. 16,636.

These patents have been thoroughly proved in America, and are recognized as the standard. We are now doing a profitable business of $50,000 per annum. Address D. FRISBIE & CO.,
481 N. 5th st., Phila., Pa.

Trade Report.

BRITISH IRON AND METAL MARKETS.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, July 11, 1883.

Scotch Pig.—A large business has been done during the week, under an active demand, and prices tend upward. Makers' prices are quoted as follows:

Coltness,	alongside,	Glasgow	61/
Langloan,	"	"	60/
Gartsherrie,	"	"	57/6
Summerlee,	"	"	57/6
Carnbroe,	"	"	55/
Glengarnock,	"	Ardrossan	55/
Eglinton,	"	"	49/
Dalmellington,	"	"	50/
Shotts,	"	at Leith	59/6

Lighterage from Ardrossan to Glasgow is 1/ ₱ ton.

Cleveland Pig.—The market is quiet, with good business doing, and prices show an upward tendency. We quote as follows, f.o.b. shipping ports:

Middlesboro'	No. 1 Foundry	43/6
"	No. 2 "	41/6
"	No. 3 "	39/6 @ 40/
"	No. 4 Forge	38/

Bessemer Pig—Is in good demand, and prices are steadier. W. C. Hematites are quoted 49/6 @ 51/ for mixed lots, Nos. 1, 2 and 3, equal portions, f.o.b. shipping ports.

Blooms.—Nothing doing.

Manufactured Iron.—Quotations are nominal. The makers will not accede to the demand of the puddlers for increase of wages, and have closed their establishments. Both men and makers are determined to hold out, and the matter will probably be settled by arbitration. The trades union leaders are striving to bring about a reconciliation, but so far their efforts have not been successful. Serious disturbances have taken place. We quote at works, nominally:

		£	s.	d.		£	s.	d.
Staff. Ord.	Marked Bars	7	10	0 @		.....		
"	Medium "	6	10	0 @		7	0	0
"	Common "	6	0	0 @		6	10	0
Hoops, 20 W. G. and over.								
"	Common Best	7	5	0 @		7	15	0
"	Medium	6	10	0 @		6	15	0
"	Common	6	5	0 @		6	10	0
Sheets, 20 W. G. and under.								
"	Ordinary Best	9	10	0 @		10	10	0
"	Common	7	10	0 @		8	0	0
Welsh Bars		5	5	0 @		5	7	6

Steel Rails.—The market is irregular. Ordinary Sections are quoted at £4. 15/ @ £5. 5/ f.o.b. shipping ports.

Iron Rails—Dull and nominal. Welsh, 30 lb and upward, are quoted, nominally, £4. 15/ @ £5. 10/, f.o.b. shipping ports.

Old Rails—Are a little firmer. We hear of inquiries for prompt delivery at Philadelphia. We quote Old D. H.'s, c.i.f. New York, £3. 12/6 @ £3. 17/6.

Scrap.—The market is a little steadier. Heavy Wrought Scrap is quoted £3. 5/ @ £3. 7/6, c.i.f. New York. Inquiries are to hand from New York for lots to be delivered during next two months. Bessemer Crop Ends are quoted 58/6 @ 60/6, f.o.b. shipping ports, for run of the mill.

Copper.—The market is steadier. Best Selected is quoted £69 @ £70, and Chili Bars, £63. 15/ @ £64. 5/.

Tin.—The market is not so steady as at last report. Straits Ingot, spot, is quoted £93 @ £93. 15/, and futures £94 @ £94. 10/.

Tin Plates.—The market is irregular. We quote:

Tin Plates, 10 x 14,	1st qual.	Charcoal	19/6 @ 20/6
" "	2d "	"	18/6 @ 19/
" "	1st "	Coke	17/6 @ 18/
" "	2d "	"	16/ @ 16/6

Spelter—Is a little steadier. We quote, unchanged, £15 @ £15. 2/6 at shipping ports for Ordinary.

Lead—Is a little lower. We quote Common English Pig, £12. 15/ @ £13.

Freights.—Steam from Glasgow to New York, 8/ @ 10/; Liverpool to New York, 6/ @ 8/; Liverpool to Philadelphia, 7/6 @ 8/, and London to New York, 7/6 @ 9/6.

TRADE AND FINANCE.

Office of *The Iron Age*,
WEDNESDAY EVENING, July 11, 1883.

The first week under the operation of the new tariff has passed with less disturbing influence than many had been led to expect. There were large withdrawals of goods from warehouse, and the consequent heavy payment of duties was at first supposed to have seriously reduced the bank surplus, as indicated by the weekly statement, but it is now more apparent that the loss of reserve is due rather to the remarkable increase of loans by our local banks within the past few weeks. The demands on account of July payments were heavy, but the amounts required in the West have also had an important influence. Never before was the aggregate accumulation of grain and produce more formidable, not to speak of iron, cotton and other forms of merchandise being carried, awaiting a market. As the harvest ripens, demands from the interior will increase. The number of business failures reported throughout the country during the week is 136, which is considerably less than the average for the last ten weeks, but is in excess of the corresponding week in the last two years. Money continues easy, on account of the quiet condition of general business. We quote 60 to 90 days' indorsed bills receivable, 5 %; four months' acceptances, 5 @ 5½. Demands from merchants dealing in imported goods increased the line of desirable paper on the market. The market for sterling was dull, and commercial bills are not plenty, but the further break in grain and provisions may stimulate shipments. Posted rates were reduced this afternoon to $4.85 and $4.88½. Actual rates were as follows, viz.: Sixty days, $4 84 @ $4.84¼; demand, $4.87½ @ $4.87¾. The bank return for the week shows a decrease in surplus reserve, which now stands at $6,644,150, against $8,303,325 at the same time last year, and $6,552,650 at the corresponding date in 1881.

The general trade of the city during the past week was moderate in volume, being broken by the holidays. Nevertheless, the gross bank clearings of this city during the five business days were $581,688,273—a gain of 7.2 % over those of the corresponding week last year. Twenty-four of the other leading cities, with few exceptions, show a marked increase over the corresponding period of last year. In dry goods there are indications of a large and healthy trade near at hand, and this prospect is encouraged by the low prices ruling for raw materials and food products. Representatives of different trade centers are already in this market in considerable numbers. At the Produce Exchange prices are much depressed, and an advance cannot be expected until exporters reduce the stocks. Beginning with Saturday, each day has witnessed a series of heavy breaks all along the line, at times with a tendency to panic, grain, provisions and breadstuffs being alike affected. "Unloading at the West" was said to have originated the difficulty, but the most obvious explanation is the relation between supply and demand, so far as concerns legitimate business. Present prices for grain, compared with prices ruling one year ago, are lower by 10¢ @ 18¢ for wheat, 25¢ @ 28¢ for corn and 13¢ @ 20¢ for oats. The enormous receipts of hogs at the packing centers also exert a disturbing influence, the bottom prices at Chicago showing a decline of $2.30 ₱ barrel on August pork compared with the lowest on June 16, and in the local market lard options went 50¢ @ 72¢ lower in the comparison. The cotton market was more excited than for some time past, caused by a pressure to sell, and prices will receive no support from the latest advices of the Agricultural Department, which indicate a general improvement in the condition of the crop. The first bale of new crop Georgia cotton arrived in this city yesterday, having been bought at 25½¢ ₱ lb. Wool is slow of sale, with prospects dubious. Coffee is fairly steady, on a basis of 9½¢ for fair cargoes, Rio grades. Of Manila hemp, sales are reported at 10⅞¢ in store; Sisal quiet at 5⅞¢. Tobacco is quiet, but firm, with little export interest. Sugar is in a position more or less nominal. Petroleum finds a slow market, with exporters indifferent. Lard oil has had a tumble such as is rarely experienced, the decline being 7¢ ₱ gallon within the last three days and 20¢ since June 15. Other oils sympathize in the movement.

On the Stock Exchange the buoyant tone prevailing at the beginning of the week was followed by the utter discomfiture of the bulls, the entire list having suffered a decline of ⅛ @ 2¾, and in one instance 7½, the latter Long Island. Favorable crop intelligence and satisfactory gains in railroad earnings afforded sufficient pretext for an advance, but on Saturday the bears saw their opportunity to raid the market, the grangers being a special object of attack. On Monday Western and trunk line stocks all suffered, an unfavorable bank statement and various rumors—subsequently proved to be false—adding to the weakness. On Tuesday the market was feverish and irregular, Central New York declining 1⅞, Delaware, Lackawanna and Western 2½, and Pacific Mail 2½. The weakest were the Northwest. To-day there was another break, without any apparent provocation. The principal dealings toward the close were in Northern Pacific at 49, 49½, 49⅜, preferred at 86⅞, 86¾, 87; St. Paul at 103¾, 103⅝, 104, 103⅞; Union Pacific at 93⅜, 93¾, 93⅝; Western Union at 81⅝ @ 82; Lake Shore at 107½, 108, 107¾; Erie at 35⅞, 36⅛, 35⅞; Denver at 42½ @ 42⅞; Lackawanna at 125⅜, 126, 125¾; New York Central at 117⅛ @ 117¾; Omaha at 45¼, 44, 44½; Manitoba at 113½, 115⅜, 115¼; Oregon and Transcontinental at 81¼ @ 81⅞; Reading at 57, 56⅞, 57⅛.

United States bonds are firm, and to-day are ⅛ higher for the 3s, prices closing as follows:

	Bid.	Asked.
U. S. 5's, 1881, continued at 3½	101	—
U. S. 4½'s, 1891, registered	112¾	113
U. S. 4½'s, 1891, coupon	112¾	113
U. S. 4's, 1907, registered	118⅞	119⅛
U. S. 4's, 1907, coupon	118⅞	119
U. S. 3 per cents	103	103⅛
U. S. Currency 6's, 1895	127	—
U. S. Currency 6's, 1896	128	—
U. S. Currency 6's, 1897	129	—
U. S. Currency 6's, 1898	130	—
U. S. Currency 6's, 1899	131	—

State bonds are dull. Alabama, Class C, sold at 82½; Arkansas funded 6's at 17½, and Georgia 7's at 113¼.

The imports of general merchandise into this port during the week were increased by the operation of the new tariff, the total being $9,764,367, of which $7,061,254 represented general merchandise and the remainder dry goods. There was no marked change in the receipts of the leading items, sugar, coffee and undressed hides being the most prominent articles. Since January 1, the imports amount to $241,050,153, against $261,806,603 for the corresponding period of 1882. According to the Custom House reports, the importations of specie and bullion at this port during the week ending July 6 were $36,865, consisting of $15,091 in gold and $21,774 in silver, as against a total of $58,127 for the week ending July 7 last year. The exports of domestic produce from the port during the past week were rather light, the total being but $5,780,758, against $8,025,017 for the same week last year. There was a fair movement of petroleum, but the exports of cotton, breadstuffs and provisions were very moderate. Since January 1 the exports aggregate $182,728,582, compared with $166,580,114 for the corresponding period of 1882.

The Attorney-General has given an opinion to the Secretary of the Treasury that the exportation of bonded whisky to Bermuda, with a view to its reimportation for the purpose of evading or delaying payment of the tax, is not an exportation within the meaning of the law. The Attorney-General holds, however, that the tax due upon the spirits at the time of exportation is collectable on its return to this country.

Respecting the condition of the crops, the tenor of advices received from a wide area in the West and Northwest encourages the expectation of a yield equal to last year's, wheat alone excepted. Barley and oats are unusually good, wheat is about up to the average, and the recent hot weather has been extremely favorable to corn.

MINING STOCKS.

The closing quotations for mining stocks are as follows:

	Bid.	Asked.
Amie	14	15
Alice	2.25	2.75
Alta. Mont	....	4
Bodie	....	1.00
Bulwer	....	1.00
Bassick	....	10¼
Bradshaw	....	35
Caled. B. H.	85	1.05
California	11	15
Climax	11	....
Con. Imp.	4	7
Con. Va.	42	47
Chrysolite	1.20	1.25
Central Ariz.	....	30
Durango	4	....
Decatur	....	4
Eureka Con.	....	4.50
East. Or	70	72
Elko Con.	20	25
Father de Smet	....	4.05
Gold Placer	2	....
Gr'n Mtn.	75	....
Gold Stripe	8	9
Hukil	4	....
Horn Silver	7⅛	7⅝
Hall-Ander	75	80
Independence	....	85
Iron Silver	2.85	2.95
Lacrosse	8	....
Leadville Con.	....	60
L. Chief	50	....
Navajo	2 75	3.30
N. Standard	....	10
N. Belle	7.00	....
N. Cen. Coal	12½	12¾
Pipe Line cer.	1.12	1.12½
Robinson Con.	55	....
Red Elephant	5	8
Sierra Nev.	4.10	....
Standard	6¼	....
Silver King	....	9¾
Sutro Tun.	20	21
Stormont	35	45
Sierra Grande	1.15	1.20
Parnell	....	47
Sonora Con.	24	25
Un. Con.	4.50	....
Vizina	....	80

GENERAL HARDWARE.

Although it is still early to expect much activity in business, buyers are beginning to make their appearance in this market, especially from the South, and a very good feeling prevails. The general anticipation is for a good fall business, and it is admitted that prices for goods in general are low enough. While there would seem to be but little prospect of any great advance in prices, there seems also to be little probability of important declines, and as the smallness of stocks, occasioned by the careful buying of the past few months, is becoming irksome to the trade, the natural tendency will be toward larger orders than have been given lately. The business of the last six months has footed up a very fair aggregate, and most houses are looking back at the business of the last five or six months with more satisfaction than they looked forward to it.

The Nail market continues to maintain the firmness which has characterized it for so many weeks, although we have now reached a time when lower prices were expected. The demand, however, has continued exceptionally large, and has fully absorbed the production, so much so that Nails continue very scarce, and there is considerable difficulty in obtaining the smaller sizes. This scarcity of the smaller sizes is general throughout the East, and, we believe, exists also in the West. The price continues firm at $3, which is shaded only for particularly desirable orders.

The American Screw Co. have issued the following discount sheet, taking effect on the 2d inst., in which the changes are a reduction in the price of Philadelphia Pattern Tire Bolts from discount 75 per cent. to discount 80 per cent.; Eagle Philadelphia Tire Bolts from discount 80 per cent. to discount 82½ per cent.; in Bay State Tire Bolts from discount 85 and 5 per cent., old common list, to 65 per cent., new common list of February 28, 1883, now first adopted by the American Screw Co.

	Per cent.
Iron Black, Iron Tinned, Block and Carriage Rivets,	40
Rivets in Bulk	40
Burrs	40
Philadelphia Pattern Tire Bolts, Best Quality.—Philadelphia List	80
Eagle Philadelphia Tire Bolts	82½
Bay State Tire Bolts, New Common List	65
Flat Head Iron Machine Screws	55
Round " " " "	50
Fillister " " " "	45
Flat Head Brass " "	55
Round " " " "	50
Fillister " " " "	45
Taps for Machine Screws	35
Stove Bolts	40
Sink Bolts	40
Pointed Wires	40
Tapped Nuts	20
Hand Rail Screws	70
Coach Screws (by the keg, 150 pounds)	70

With special additional discounts for large quantities.

We have received the following dispatch:

SARATOGA, N. Y., July 11, 1883.

To the Editor of The Iron Age: At a meeting of all the manufacturers of Wood Screws, held at Saratoga Springs, July 11, the follow-

ing discounts were adopted, to take effect immediately: Flat Head Iron and Brass, 55 per cent.; Round Head Iron, 50 per cent.; Round Head Brass, 45 per cent.

S. SICKELS, Secretary.

The manufacturers of Cordage have advanced the price of Manila Rope ½ cent per pound making the prices as follows, subject to the usual discount of 1 cent per pound:

	Cents ℔ lb.
1¼-inch cir. and upward	16
12 thread, or ⅜-inch diameter	16½
6 and 9 thread, or ¼ and 5-16-inch diameter	17
Hay Rope, 2, 3, 4 or 5 thread	16
Bolt and Point Rope	17½
Tarred Rope and LathYarn	15½
Stave, Leather and Hop Twine	16½

The Henry B. Newhall Co. have been appointed Eastern and Southern agents for David Wadsworth & Son, Scythe manufacturers, of Auburn, N. Y.

Graham & Haines have the general agency for the Hubbard Gleaner and Binder, which has been improved for 1883, and is now considered a practical success. The Gleaner and Binder is warranted to bind grain under all reasonable circumstances, when following the reaper, or oats that have laid to cure, if properly managed, in a workmanlike manner, and equal to the best Binder in the market, when grain has been properly delivered by any of the modern approved side-delivery self-raking reaping machines. The price to farmers is $150, f.o.b. at the factory at Norristown, Pa. Wholesale dealers and established agents are allowed a discount of 20 per cent. All Binders are sold subject to the fullest warranty.

We have received the illustrated catalogue and price list of the Hardware goods made by John E. Quackenbush & Son, New York. The following table of discounts will give an idea of the contents of the catalogue:

Knobs and Escutcheons	dis. 50 %
Porcelain Shutter Knobs	6c&10 %
Mineral and Jet Shutter Knobs	50 %
Patent Roller Sheaves	6c&10 %
Mouth-pieces and Bell Handles	50 %
Porcelain Plates—all kinds	20 %
Refrigerator Hardware	45 %
Bronze Metal Butts	66⅔ %

Subject to an extra quantity discount.

The Scott Mfg. Co., of Baltimore, manufacturers of Phillips' Excelsior Fruit and Vegetable Evaporator, send us a pamphlet descriptive of this apparatus, The fruit-evaporating interests of the country are rapidly increasing, and this apparatus will doubtless be in great demand, as it contains points in its construction which make it very desirable. They are also manufacturers of several articles used in the fruit industry which are adapted for domestic use. They claim that their Rotary Knife Peach Parer is the only machine that will successfully pare peaches, and that the experience of the past five years has removed the distrust with which all such machines are apt to be regarded by the trade, their sales increasing largely every year. The Oriole Apple Parer, Corer and Slicer, as well as the Victor, are inventions of Mr. Scott on entirely different principles from any other machines ever made, and are already well known to the trade throughout the country. They consider the Gold Medal Apple Parer the most rapid machine in the market. The New Idea Can Opener is new and recently patented. As indicated by the name, this Can Opener is entirely a new idea, and on new principles. By opening a can under the flange the entire top is removed and given a flaring edge, enabling the contents to be emptied out in bulk, as there are no ragged edges in the way. It will open round or square cans. See advertisement on page 27.

IRON.

American Pig.—The condition of this market is very much as at our last report, and prices remain with but very little change. The scarcity of No. 1 still continues, and the market is firmer for this grade than for either of the others. Quotations of $21 for No. 1 are occasionally heard, but it need not be expected to procure good Iron at this price; $22 is the lowest price at which standard brands should be expected, and the price ranges from that to $23, within which range we note sales of about 1700 tons. For September or October delivery an advance of 50 cents to $1 per ton would be demanded. We quote Foundry No. 1, $22 @ $23; Foundry No. 2, $19 @ $20; Gray Forge, $18 @ $19.

Scotch Pig.—During the week since our last there have been perhaps 1000 tons sold to arrive, in lots of 100 to 200 tons. The tone of the Scotch market and the firmness in freights have produced an impression that prices will be higher, and consequently sales for delivery beyond the near future are made at advanced prices. We quote Eglinton, $21 @ $21.50 from yard; Carnbroe, $22.50 @ $23, to arrive; Glengarnock, $23 from yard; Dalmellington, $21.50 from ship; Summerlee, $23 @ $23.50 from ship; Coltness, $24 from ship; Gartsherrie, $24 from yard; Langloan, $24 from ship.

Old Rails.—There have been no important transactions, although a number of small sales have been made, among them 160 tons of Ts at $21. We quote Ts $21.50 @ $22.

Bar Iron.—The market for Bar Iron during the past week has been largely in sympathy with the National holiday season. Business has been very dull, and an apparent stagnation reigns throughout the trade. There has not been more than about one-half the transactions during the past week that there was during the same period last year. The falling off in demand is partly attributable to the extreme heat, which has greatly interfered with building and outdoor work in general. The decrease in demand, however, has not had any effect on prices, which are firm, and, considering the volume of business transacted, is regarded as a favorable showing for the position which prices are likely to assume under a more active market. Refined Bar Iron is quoted at the mills at $1.90 @ $2, but these figures would be shaded perhaps a tenth for desirable orders by mills which are not overrun with work. From store we quote Refined Bar at $2.30 @ $2.40, and Common at $2.10 @ $2.20.

Scrap Iron.—There seems to be a little more activity among consumers of Scrap, but we are unable to find anything thus far that looks like trade. The market continues quiet at $24 @ $24.50 for Selected Yard, and $21.50 @ $23 for ex-ship. These prices are largely nominal on account of the varied quality of the stock offered.

New York Metal Exchange.

On sales made of standard American pig iron on and after July 9th, the following brands only may be delivered:

Hudson,	Poughkeepsie,	Henry Clay,
Leesport,	Chestnut Hill,	Wm. Penn,
Macungie,	Thomas,	Allentown,
Saucon,	Crane,	Carbon,
Coleraine,	Temple,	Coplay,
Lucy,	Chickies,	Glendon,
Emaus,	Oxford,	Andover,
Manhattan,	Keystone (of Reading),	Reading,
Olcott,	Colebrooke,	Lehigh.
Clove.		

On sales of "special" American pig iron, the following brands only may be delivered:

Crane,	Glendon,	Carbon,
Thomas,	Lehigh Iron Co.'s Iron,	Reading,
Allentown,	Hudson,	Coleraine,
Manhattan,	Poughkeepsie,	Bushong,
Andover,		Macungie.

ROBERT ROBERTSON,
W. W. VAN VOORHIS,
U. O. CRANE,
} Committee on Pig Iron.

The following sales have been reported during the week:

FRIDAY, July 6.

200 tons American Pig No. 1, Sept. del., at $23.00
100 " " " " Oct. " " 23.25
10 " Straits Tin, spot, at 21½¢

SATURDAY, July 7.

200 tons American Pig No. 1, Nov. del., at $23.25
25 " Straits Tin, Nov. del., at 21¼¢
50 " " " July-August ship 21¢
25 " " " August ship 21¢

MONDAY, July 9.

200 tons American No. 1 Pig, Sept. del., at $22.75
10 " Straits Tin, spot 21¢
25 " " " August ship 21¢
10 " " " July 21¢

TUESDAY, July 10.

200 tons American Pig No. 1, Sept. del., at $22.75
100 " " " " " 22.75
200 " " " " Oct. " 22.87½
100 " " " " Sept. " 22.75
25 " Straits Tin, Oct. del., at 21¼¢
25,000 lbs, Baltimore Copper, spot 14¼¢

WEDNESDAY, July 11.

No sales on call.

METALS.

Copper.—Our market has been excessively quiet, sales being limited to some 200,000 lb. Lake at 15⅛¢ @ 15¼¢, while other brands sell at 14¢ @ 14¼¢. London yesterday cabled Best Selected, £69. 10/, and Chili Bars, £64. 10/, while to-day we are cabled from there as under: "Market steadier. Best Selected, £69 @ £70, and Chili Bars, £63. 15/ @ £64. 5/." Manufactures may be quoted as under: Bottoms, 24¢; Braziers, 24¢; Sheathing, 22¢, and Bolt Copper, 24¢. O'Neill's Patent Planished Copper, net cash, 14 x 48, 14 and 16 oz. and heavier, 35¢; 12 oz. and lighter, 38¢; by the case, respectively, 34¢ and 37¢; Boiler sizes, 7 in., 14 x 52; 8 in., 14 x 56; 9 in., 14 x 60; 14 and 16 oz., and heavier, 37¢; by the case, 36¢; 24 x 48 and 30 x 60, 14 and 16 oz. and heavier, 39¢; 12 oz., 42¢. Tinning, 14 x 48, by the case, 8¢ ℔ sheet. Boiler sizes, 7 and 8 in., 12¢ ℔ sheet; other sizes, not larger than 30 x 60, 2½¢ ℔ square foot; 14 x 48, less than case, 10¢ ℔ sheet; Boiler sizes, 9 inches, 15¢; larger than 30 x 60, 5¢ ℔ square foot. Messrs. James Lewis & Son, Liverpool, write under date June 28: "*Copper.*—The arrivals at this port to date this month from the United States have been 580 tons Argentiferous Copper Matte; 610 tons do. Ore; 144 tons Copper Slabs and Ingots. Chief part of the Ore is sold under a contract which we made with the smelters some time ago; the Matte is sold either by private treaty or public ticketing. The smelters are willing to pay higher prices under a contract for regular supplies than they will pay for isolated parcels. Their argument for this is that it greatly simplifies their details of smelting if they are always working on the same Ore or Matte, than if they are constantly changing the quality and Copper and Silver contents of the parcels they treat in each furnace. Therefore, there have been only three firms who have purchased on a large scale Argentiferous Ores and Matte, but latterly a firm with works in the immediate neighborhood of Liverpool have commenced to treat these Ores and Matte and have paid higher prices than the old-established smelters, who, it is generally understood, work together, and arrange to divide among them at their own prices what they purchase, thus avoiding competition. It is in contemplation to erect extensive works in this neighborhood, or to enlarge existing works, so as to treat the large supplies that are now arriving at this port, and this will probably lead to higher prices being paid. As for the Copper market, the position of the same at present is that a syndicate appears to have been formed which has purchased Chili Bars to a large extent, forcing the price up from £61. 10/ to £64. It is understood that they are prepared to buy 10,000 tons of Bars, and, having gradually acquired this quantity without much advance in prices, intend to force up the price in the autumn, when, with a good harvest, trade is expected to be active and smelters and manufacturers bare of stock. Had the production and consumption of Copper remained the same as last year, there would probably be but little difficulty in attaining a much higher range of prices than at present ruling, but the large supplies now coming over here from the United States, at present amounting to about 1000 tons Fine a month, irrespective of Lake Superior and "Copper Queen" Copper sold for direct shipment to the French manufacturers, and which so far is reported to amount to about 4500 tons Lake Superior and 750 tons "Copper Queen," may disappoint their expectations. An increased production of about 7000 tons Fine was required to keep up stocks in England and France at the end of this year to the level at which they were at the commencement of it, assuming consumption to remain the same. As far as we can at present judge, however, the deficiency will be more than made up by the imports from the United States—say 7000 tons into England and 4000 tons into France—over last year's supply from thence. An increased production of Spanish Precipitate is expected, owing to the satisfactory rainfall in that country, but this will be but a set off to the exceptional importations last year from Russia and Peru."

Tin.—Our market during the week under review has declined somewhat, in sympathy with primary markets. London cabled yesterday £93 on the spot, Straits Tin, quiet, and with a limited demand. Singapore has also declined £2 ℔ ton since last week, the quotation to-day being £94. 6d., cost and freight to New York, ℔ ton. We quote, at the close, on a firmer market, 21¼¢ @ 21⅜¢, Straits Tin, large lines, and Lamb & Flag 22½¢. From London we receive this afternoon the ensuing cable message: "Market not so steady as at last report; Straits Ingot, spot, £93 @ £93.15/ and futures £94 @ £94.10/." Mr. Charles Nordhaus, 17 Cedar street, New York, favors us with the statistics at foot:

	Tons.
June 1—Stock on this coast	2200
June—Arrivals	350
	2550
Consumption in June	1000
Leaving stock on hand July 1	1550
Add afloats	1550
Visible supply, July 1	3100

Tin Plates.—The free arrivals have been as freely distributed, so that little is going into warehouse. We quote at the close, large lots, ordinary brands, ℔ box: Charcoal Bright, $5.75 @ $6; do. Ternes, $5.15 @ $5.37½; Coke Tin, $5.07½ @ $5.20, and do. Ternes, $4.87½ @ $5. Liverpool has been steady at 16/3 for Coke, and 18/6 @ 20/ for Charcoal. From London we are wired that the market is irregular.

Lead.—There has been a total absence of demand, and any amount of sales rumored on the spot, which we have been unable to trace to a reliable source. Nothing has come to our notice beyond trifling sales, the market nominally ruling all the way between $4.30 and $4.37½ Common Domestic, while Refined is worth $4.45, nominally. At the West the markets meanwhile remain quite firm, with several hundred tons selling at St. Louis at $4.15 for Corroding, the asking price for Hard being $4.12½ in that city, and freight this way from East St. Louis remaining 30¢. From London we receive this afternoon the following cablegram: "Market a little lower. Common English Pig, £12. 15/ @ £13." Manufactures are quoted as follows: Lead Pips, 6¾¢; Sheet Lead, 7½¢; Tin-lined Lead Pipe, 15¢ ℔ lb, and Block-tin Pipe, 45¢, less the usual discount to dealers.

Spelter and Zinc.—Nothing beyond small jobbing sales have transpired, the price for Common Domestic being 4½¢ @ 4⅝¢, and for Silesian, nominally, 5½¢. From London we receive the following per cable: "Spelter is a little steadier. Ordinary at shipping ports, £15 @ £15. 2/6." We quote Bertha Refined, 7¾¢ @ 8¢, and Bergenport, 9½. *Sheet Zinc* is quiet at 6¢.

Antimony.—The market during the week has been dull at 9⅜¢ for Hallett and 10⅜¢ for Cookson. Mail advices from London to June 30 quote French Star Regulus £39 @ £40.

FOREIGN TRADE MOVEMENTS.

The following is a summary of foreign trade movements during the past week:

IMPORTS.

For the week ended July 6:

	1881.	1882.	1883.
Total	$7,295,138	$7,570,274	$9,764,387
Prev. reported	214,576,734	$254,634,887	$230,284,156
Since Jan. 1	$221,871,872	$262,205,161	$240,048,543

Included in the imports for the second quarter of the year were leading articles of merchandise, valued as follows:

	Pkges.	Value.
Antimony	1,052	$57,422
Aluminum	1	690
Anvils	239	1,755
Brass goods	871	86,485
Bismuth	16	8,122
Bronzes	193	24,306
Chains and anchors	176	9,970
Clocks	281	27,057
Copper	...	43,553
Cutlery	1,899	561 090
Guns	742	142,414
Hardware	371	13,711
Iron hoops, tons	101	1,975
Iron, pig, tons	35,608	753,693
Iron, sheet, tons	608	41,501
Iron, ore, tons	11,576	28,922
Iron tubes	637	873
Iron cotton ties	9,114	8,393
Iron, other, tons	11,500	391.019
Railroad bars	1,033	4,864
Lead, pigs	4,834	19,255
Machinery	1,985	212,203
Metal goods	5,685	321,653
Nails	3,967	30,459
Needles	195	73,857
Nickel	86	14,287
Old metal	...	98,593
Platina	80	57,243
Percussion caps	197	25,451
Pins	36	4,690
Plumbago	9,687	117 395
Quicksilver	6,452	169,905
Saddlery	278	42.502
Steel	1,122,263	1,961,288
Steel blooms	976	7,193
Spelter, lbs	2,682,695	94,313
Tin plates, bxs	488,850	2,267,740
Tin slabs, lbs	6,604,156	1,437,8-6
Tin, bbls	30	1,660
Wire	23,489	115,937
Zinc, lbs	334,662	13,882
Zinc oxide	2,467	26,171

The quantity of metals and hardware imported during the past week compares with previous dates as follows:

	For the week.	27 weeks of 1883.	Same time 1882.
Cutlery, pkgs	391	4,198	3,673
Hardware, pkgs	52	735	568
Iron, R. R., bars	...	6,324	74-310
Lead, pigs	...	3,637	17,338
Steel, pkgs	120,795	2,139,283	1,095,796
Tin, bxs	24,617	966.475	1,171.773
Tin slabs, lbs	142,358	10,362,174	8,859,218

OLD METALS, PAPER STOCK, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy	℔ lb.	$0.12	@ .....
" light	"	.10	@ .....
Copper Bottoms	"	.10	@ .....
Yellow Metal	"	.07½	@ .....
Brass, heavy	"	.08	@ .....
" light	"	.07	@ .....
Composition, heavy	"	.12	@ .....
Lead, heavy	"	.04	@ .....
Tea Lead	"	.03½	@ .....
Zinc	"	.02¾	@ .....
Pewter, No. 1	"	.22	@ .....
" No. 2	"	.18	@ .....
Wrought Iron	℔ ton.	22.50	@ .....
Light "	"	12.00	@ 13 00
Stove Plate	"	11.50	@ 12.00
Machinery "	"	14.50	@ 15.00
Grate Bars	"	4.50	@ .....
Stereotype Plates	℔ lb.	.04½	@ .05
Electrotype "	"	.04¼	@ .04½
Small Type	"	.05	@ .05½

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen	℔ lb.	3½c.	@ 4 c.
White Cotton, New	"	3½c.	@ .....
" No. 2	"	2½c.	@ 2¾c.
White, No. 1	"	3¾c.	@ 4 c.
" No. 2	"	1¾c.	@ 2 c.
Seconds	"	½c.	@ 1 c.
Soft Woolens	"	5 c.	@ 6 c.
Mixed Rags	"	1½c.	@ 1¾c.
Gunny Bagging	"	1½c.	@ .....
Jute Butts	"	1¾c.	@ .....
Kentucky Bagging	"	.....	@ 3¼c.
Book Stock	"	1¾c.	@ 2 c.
Newspapers	"	1 c.	@ ...
Waste Paper and Scraps	"	½c.	@ ...
Kentucky Bale Rope	"	3½c.	@ 4 c.

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending July 11, 1883.

Hardware.

Baldwin Bros. & Co.
Gun barrels, cs., 14
Boker Hermann & Co.
Hdw., cutlery and guns, pkgs., 288
Drexel, Morgan & Co.
Arms, cs., 72
Field Alfred & Co.
Casks, 18
Guns, cs., 17
Mdse., pkgs., 48
Anvils, 374
Folsom H. & D.
Guns, cs., 27
Graef Cutlery Co.
Cutlery, cs., 7
Hartley & Graham,
Guns, cs., 5
Hildick A. H.
Chains, cs., 28
Chains, pcs., 22
Chains, cks., 2
Hoorebeke Ad. Van,
Plow, 1
Ivery ——
Mach'y, case, 1
Merch. Disp. Co.
Arms, cs., 13
McCoy & Sanders,
Casks, 2
Morgan J. S. & Co.
Cases, 14
Mitchel J. & T.
Mach'y, case, 1
Moore's J. P. Sons,
Guns, cs., 64
Moss F. W.
Files, cks., 9
Moseman & Bro.
Casks, 3
Cases, 2
Ordnance Department,
Washington,
Utensils of firearms, cs., 40
Gun barrels, cs., 10
Schoverling, Daly & Gales,
Cases, 21
Scoville Mfg. Co.
Mdse., cs., 3
Scott W. P.
Guns, cs., 6
Strasberger Oscar & Co.
Casks, 16
Cases, 8
Tryon Ed. H. & Co.
Arms, cs., 19
Vom Cleff & Co.
Chains, cks., 16
Wiebusch, Hilger & Co.
Chains, cks., 96
Ironware, cks., 21
Anvils, 370
Casks, 5
Witte John G. & Bro.
Arms, cs., 64
Needles, cs., 2
Cutlery, cs., 13
Order,
Anvils, pkgs., 52
Box, 1
Mach'y, cs, 8
Mach'y for Baranquilla

Iron.

Barr Ed.
Tubes, 234
Baring Bros. & Co.
Wire, bdls., 9500
Rods, bdls., 2636
Wire rods, bdls., 6021
Brown Bros. & Co.
Rivet wire rods, coils 410
Bundles, 550
Coddington T. B. & Co.
Sheets, bdls., 704
Sheets, bxs., 8
Crocker Bros.
Pig, tons, 200
Spiegeleisen, tons, 396
Junge F. W. & Co.
Wire, bdls., 205
Lee James & Co.
Pig, tons, 100
Mason John W. & Co.
Wire rope, coils, 20
Meissner, Ackermann & Co.
Rivet wire, coils, 1289
Naylor & Co.
Spiegeleisen, cks., 38
Plock & Co.
Wire rods, pkgs, 762
Prosser & Sons,
Wrought tubes, bdls. 17
Perkins & Choate,
Spiegel, tons, 600
Pierson & Co.
Screw wire rods in coils, bdls., 1040
Stroud & Co.
Rails, 2011
Seager Bros.
Bars, 1353
Williamson J. & Co.
Pig, tons, 300
Order,
Pig, tons, 1283
Ore, box
Boiler tubes, 20
Ore, tons, 285
Spiegel, tons, 767
Wire rods, coils, 606
Sheets, bdls., 1142
Old tubes, lot
Wire, pkgs., 47
Wrought beams, 177
Wire, bdls., 956
Lowmoor, bars, 315
Lowmoor, bdls., 170
Rods, coils, 18
Cotton ties, bdls., 955
Cot. ties & buckles, bdls., 464
Bars, 17,092
Fish plates, bdls., 250
Old fish plates, tons, 103
Bundles, 296

Steel.

Abbott Jere & Co.
Cases, 54
Alexandre F. & Sons,
Chests, 20
Cary & Moen,
Coiled Bess. ends, bdls., 408
Rods, bdls., 18
Hildick A. H.
Cases, 22
Ladenburg, Thalmann & Co.
Cases, 10
Mayer, Strouse & Co.
Casks, 10
McIlhanney W. H.
Rails, 6590
Moss F. W.
Bundles, 112
Bars, 42
Merch. Disp. Co.
Wire, bdls., 78
Naylor & Co.
Billets, 25
Seligman J. & W.
Rails, 2400
The Tomlinson Steel Co.
Bundles, 179
Temple & Lockwood,
Bundles, 148
Bars, 28
Cases, 4
Wood, Niebuhr & Co.
Wire rods, pkgs., 232
Order,
Bands, 480
Bars, 25
Forgings, 4
Rails, 3779
Cases, 27
Steelware, cs., 7
Bundles, 2104
Packages, 45

Metals.

Bank of Montreal,
Tin plates, bxs., 1067
Baring Bros. & Co.
Tin plates, bxs., 1797
Bache, Semon & Co.
Tin, case, 1
Bear Samuel,
Copper ore, box, 1
Bruce & Cook,
Tin plates, bxs., 765
Cort N. L. & Co.
Tin plates, bxs., 11,977
Cooper Chas. & Co.
Nickel, cs., 4
Downing R. F. & Co.
Nickel, cs., 4
Eggers & Heinlein,
Old metal, box
Field Alfred & Co.
Gun caps, cs., 3
Foote Emerson,
Mdse., cs., 13
Hollender Fred. H. & Co.
Metal ware, cs., 4
Hendricks Bros.
Antimony, cks., 34
International Bank,
Platinum, case, 1
Grubb J. C. & Co.
Gun caps, cs., 5
Ketchum E. & Co.
Tin plates, bxs., 625
Lazarus A. S. & Co.
Old copper, bbl., 1
Meyer G. A. & E.
Zinc oxide, bbls., 25
Macy's Josiah Sons,
Zinc oxide, bbls., 100
Moore's J. P. Sons,
Gun caps, cs, 9
Meissner, Ackermann & Co.
Zinc plates, 9822
Pacific Mail S. S. Co.
Lead, bbls., 15
Phelps, Dodge & Co.
Tin plates, bxs., 12,418
Black taggers, bxs., 129
Tieman & Co.
Zinc oxide, bbls., 47
Western Transp. Co.
Tin plates, bxs, 490
Tin and terne plates, bxs., 2169
Order,
Tin plates, bxs., 351
Tin taggers, bxs., 330
Zinc oxide, bbls., 50
Clocks, cs., 6
Pendulum balls, case, 1
Spelter, ingots, 2136
Blasting caps, cs., 50
Tin, slabs, 1150
Antimony, cks., 100

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the week ending July 10, 1883.

	Quan.	Val.
Danish West Indies.		
Row locks, cs.	3	$36
Dutch East Indies.		
Ptlm., gals.	694,020	67,840
Amsterdam.		
Pumps, pkgs.	2	75
Hdw., pkgs.	14	275
Antwerp.		
Ptm., gls.	1,197,459	95,890
Hdw., pkgs.	32	662
Sew. ma., cs.	52	413
Copenhagen.		
Ptlm., gals.	140,940	10,600
Clocks, cs	4	50
Ag. imp., pkge	1	25
Stettin.		
Ptlm., gals.	178,710	14,073
Stockholm.		
Mf. iron, pkgs	14	294
Drontheim.		
Ptlm., gals.	152,780	13,750
Sundsvall.		
Ptlm., gals.	105,924	8,500
Elsinore.		
Ptlm., gals.	437,824	34.910
Newcastle.		
Ptlm., gals.	234,800	20,545
Mach'y, pkgs.	3	620
Hamburg.		
Ptl., gals.	1,360,031	109,091
Pins case	1	350
Ag. imp., pkgs	139	3.010
Copper, casks	46	10,407
Mf. iron, pkgs	6	221
Mach'y, pkgs.	15	1,834
Sew. ma., cs.	359	6,141
Bremen.		
Ptl., gals.	1,913,112	79,461
Mach'y, pkgs.	8	390
Cop. mat., bgs.	700	7,000
Ag. imp., pkgs.	35	1,208
Pig, press, cs.	19	800
Hdw., pkgs.	5	25
Mf. iron, pkgs	15	585
Liverpool.		
Hdw., pkgs.	66	2,211
Cop. mat., bgs.	2221	21,138
Mach'y, pkgs.	83	3,376
Cop. mtl., bbls.	30	895
Guns, cs.	6	90
Scales, cs.	1	150
Sew. ma., cs.	31	1,277
Mf. iron, pkgs	18	825
Pumps, pkgs.	2	150
Copper, casks	45	5,113
Clocks, pkgs	74	3,009
Ag. imp., pkgs	102	2,074
Glasgow.		
Sew. ma., cs.	229	4,790
British East Indies.		
Ptlm., gals.	595,000	58,750
London.		
Ptl., gals.	1,095,963	91,300
W. mills, cs.	11	447
Clocks, pkgs.	411	5,378
Sew. ma., cs.	71	2,153
Lead traps, cs	13	697
Presses, cs.	6	84
Hdw., pkgs.	57	1,903
Ag. imp., pkgs	40	860
Pumps, pkgs.	12	901
Mach'y, pkgs.	82	4,262
Wringers, cs.	23	200
Pins, case	1	16
W. gds., case,	1	45
Nails, cs.	6	138
Gibraltar.		
Ptlm., gals.	38,000	3,788
Clocks, pkgs.	12	248
Hull.		
Cutlery, cs.	5	123
Clocks, cs.	2	89
Mach'y, pkgs.	3	211
Hdw., pkgs.	40	664
Ag. imp., pkgs	4	205
Mf. iron, pkgs	3	140
Bristol.		
Ptlm., gals.	173,789	13,903
Nails, bxs.	6	166
Mach'y, pkge	1	75
Canada.		
Wire, cs.	1	202
Tin plts., bxs.	136	720
Salonica.		
Ptlm., gals.	282,800	21,534
China.		
Cartridges, cs	400	2,800
British West Indies.		
Mf. iron, pkgs	7	62
Hdw., pkgs.	10	127
Scales, cs.	3	68
Nails, kegs	5	20
Plb. mtl., pkgs	11	42
Sew. ma., cs.	3	74
Lead, rolls	2	84
Ptlm., gals.	25,797	2,891
Ag. imp, pkgs	5	40
Mach'y, pkge.	1	64
British Possessions in Africa.		
Ptlm., gals.	62,300	6,849
Ag. imp., pkgs	112	6,228
Wire, coils	50	390
Mach'y, pkgs.	13	1,426
Scales, cs.	12	41
Mf. iron, pkgs	35	693
Nails, kegs	181	615
Pumps, pkgs.	2	157
Clocks, cs.	8	180
Hdw., pkgs.	281	7,000
Cutlery, cs.	12	147
Nails, pkgs.	11	107
Clocks, cs.	8	180
Newfoundland.		
Ptlm., gals.	3948	337
Havre.		
Ag. imp., pkgs	78	4,056
Copper, casks	892	56,000
Sew. ma., cs.	24	770
Copper, bars	496	20,900
Pumps, pkgs.	5	130
Clocks, case	1	16
Hdw., pkgs.	3	76
Brass nails, cs	14	540
Cuba.		
Hdw., pkgs.	96	1,645
Mf. iron, pkgs.	463	4,438
Nails, kegs	100	403
Mach'y, pkgs.	79	3,663
Clocks, cs.	4	147
Metal, cs.	2	98
Sew. ma., cs.	18	416
Pumps, pkgs.	2	74
Boiler	1	250
Nails, pkgs.	35	179
Cutlery, cs.	1	$44
Tacks, case	1	21
Spikes, pkgs.	173	450
Ag. imp., pkgs	54	835
Springs, case	1	23
Venezuela.		
Pumps, pkgs.	3	40
Mf. iron, pkgs	4	30
Mach'y, pkgs.	6	88
Ptlm., gals.	2500	225
Cadiz.		
Ptlm., gals.	10,000	975
Uruguay.		
Ag. imp., pkgs	410	12,840
Nails, pkgs.	12	207
Ptlm. gals.	20,000	1,925
Sew. ma., cs.	50	750
Clocks, bxs.	33	663
Mf. iron, pkgs	12	103
Marseilles.		
Ptlm., gals.	310,427	20,176
Dunkirk.		
Ptlm. gals	227,880	6,800
Corfu.		
Ptlm., gals.	129,920	11,675
Constantinople.		
Ptlm., gals.	236,010	21,340
Fiume.		
Ptlm., gals.	350,600	25,000
Porto Rico.		
Mf. iron, pkgs.	97	718
Clocks, cs.	3	33
Cutlery, cs.	8	114
Tinfoil, case	1	46
Fire engines, bxs	4	1,000
Sew. ma., cs.	7	312
Scales, cs.	14	355
Mach'y, pkgs.	10	1,540
Ptlm., gals.	17,870	1,865
Hdw., pkgs.	14	139
Ag. imp., pkgs	15	120
Alarm bell	1	60
Iron safe	1	425
Buckles, case	1	50
Phillipine Islands.		
Ptlm, gals.	179,750	17,650
French Possessions in Africa.		
Ptlm., gals.	263,970	24,130
Brasil.		
Iron safe	1	375
Cutlery, cs.	19	797
Nails, cs.	174	990
Mach'y, pkgs.	10	2,501
Ptlm., gals.	17,260	1,795
R. R. materi's, pkgs	104	1,827
Steel rails, pcs	402	2,475
Firearms, cs.	2	216
Clocks, pkgs.	43	966
Ag. imp., pkgs	7	115
Hdw., pkgs.	235	1,378
Sew. ma., cs.	150	3,077
Car springs, cs	4	410
Nails, kegs	32	145
Mf. iron, pkgs	12	186
S'p'dware, cs.	6	345
Tacks, bxs	20	364
Irons, cs.	50	225
Pumps, pkgs.	9	355
Cotton gins, cs	4	210
Hayti.		
Ptlm., gals.	1870	212
Mf iron, pkge	1	18
Hdw., cs.	2	55
Scale	1	8
Argentine Republic.		
Hdw., pkgs.	14	887
Cartridges, cs	20	287
Ptlm, gals.	10,000	1,000
Mf. iron, pkgs	208	2 007
Arms, case	1	156
Ag. imp., pkgs.	1180	38,500
Japan.		
Ptlm., gals.	724,340	71,326
Nails, kegs	100	298
Scales, cs.	25	473
Hdw., pkge	1	141
Mexico.		
Hdw., pkgs.	38	1,252
Scales, case	1	29
Mf. iron, pkgs	25	250
W. cloths, pkgs	4	40
Pumps, pkgs.	12	1,608
Boilers	3	3,287
Ag. imp., pkgs	16	149
Oxide, carboy	1	205
Y. met. sht'g, cs.	3	183
Cutlery, pkgs.	15	343
Ptlm., gals.	25,850	2,761
Iron pipe, bdls	47	212
Mach'y, pkgs.	61	7,514
Firearms, case	1	360
Cartridges, cs	50	750
Nails, kegs	7	40
R. R. material, pkgs	5133	4,326
Locomotives

last week. The half-time arrangement for the present week is the last of restriction, so far as agreed upon.

Bituminous is as dull as ever, and is quoted: Clearfield, alongside, $3.75 @ $3.85; Cumberland, $4 @ $4.10.

PHILADELPHIA.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, July 10, 1883.

Pig Iron.—There has not been much business done during the week, although buyers are making inquries for large lots, and the general feeling is one of confidence in values. Prices are of a more uniform character, and it seems likely that there will be more regularity in quotations than there has been for some time past. It cannot be said that prices are any higher, but they are steady, and concessions cannot be had, unless under very exceptional circumstances. Really good Foundry Irons are held with much firmness, and anything of established character will bring from $21 to $22.50, delivered, according to circumstances. A few choice brands command from $23 to $23.50, the best Standards, $22 @ $22.50, and what may be called good Foundry Irons may be had at $21 @ $21.50, with a pretty good demand, and offerings not at all out of proportion to the requirements of buyers. As regard Foundry Irons, there is no great likelihood of any immediate change in values, but prices are steady to firm, with the chances all in favor of an active market at prices within the limits now quoted. The higher grades are really scarce, but the steady supply of Southern Irons of good quality is exercising considerable influence upon values, and the tendency toward higher prices is therefore less marked than it would be under other circumstances. No. 2 Foundry is also in better shape, with $19 @ $21, delivered, as the extreme quotations, the heaviest business being at about $20. There is still a good supply of this class of Iron, but buyers appear to be taking hold with more confidence, and when good Irons can be had at $19 @ $20 there is no difficulty in effecting sales. As a rule, sellers are asking an advance of about $1 ℔ ton, and in the meantime prices are held with a fair degree of confidence. Mill Irons are steady and firm, but not much higher. A few brands are a trifle dearer, mainly because they were put down to what seemed to be unnecessarily low figures some time ago, but the average rates show probably 25¢ @ 50¢ advance on prices current during the early part of June, sales having been made at from $18.50 to $20, delivered, according to brand. Taking the market as a whole, it may be considered in a healthy condition, prices steady, demand fair, supplies moderate, and, while no material advance is looked for, there is a general belief that prices now quoted are perfectly safe.

Bessemer Pig.—No business has been done for some time past, neither are there any immediate indications of a renewal of the demand. Prices are weak, and as freights are likely to be somewhat lower, sellers would probably make concessions if consumers manifested a desire to enter into negotiations. Prices are nominally $21 @ $21.50, but there is no prospect of buyers coming into the market at much over $20.

Spiegeleisen.—Market very weak, with sellers at $31 for 20 %, at which 1000 tons were placed.

Blooms.—There is only a fair demand, prices ruling about as follows: Charcoal Blooms, $57.50 @ $60; Run-out Anthracite, $48 @ $50; Scrap Blooms, $42.50 @ $45; Northern Ore Blooms, $40 @ $42.50.

Muck Bars.—Demand only moderate, although sellers are asking a slight advance, say $34 @ $34.50 at mill. Small lots, extra quality, command full quotations, but buyers of large lots expect to do at least 50¢ ℔ ton better.

Bar Iron.—The demand has not been very large, but as the mills have been closed for several days, there has not been much anxiety to secure orders. Work has been generally resumed during the past few days, however, but there are plenty of orders to go on with, so that prices are steady and unchanged. City mills quote 2.2¢ @ 2 25¢ for the general run of orders, but slight concessions would doubtless be made on orders of a desirable character, as to amount and specification. Skelp Iron is very quiet, and may be called nominal at about 2.15¢ @ 2.2¢ for Grooved, but there is not much demand.

Plate and Tank Iron.—The market for this class of Iron is very firm, and it would be difficult to place orders of any size without stiffening prices. The mills appear to be comfortably situated as regards orders, and while the demand is not particularly important, it is large enough to keep prices firm, with a slight upward tendency. Prices are about as follows: Ship Plate and Tank Iron, 2.4¢ @ 2.5¢; Shell Iron, 3¢ @ 3.25¢; Flange, 4¢@ 4.25¢; Fire-Box, 5¢ @ 5.25¢.

Structural Iron.—There has been a considerable amount of business placed during the week, although in no case have the lots been particularly large. The mills are all full of work, however, and the few days' suspension has caused quite an accumulation of work. Bridge builders are likely to be very full of work during the balance of the year, and manufacturers of Shaped Iron hold prices with considerable firmness. Angles are now quoted at 2.4¢; Tees at 3.2¢; Beams and Channels at 3.5¢.

Sheet Iron.—A fair business has been done during the week, and stocks in manufacturers' hands, which were beginning to be very heavy, are now gradually diminishing. Prices are steady, and for small lots may be quoted as before, viz.:

Common Sheets, No. 28	4½¢
Common Sheets, Nos. 26 and 27	4¾¢
Common Sheets, Nos. 21 to 25	4 ¢
Common Sheets, Nos. 18 to 20	3¾¢
Best Refined, ¼ % advance on the above.	
Best Bloom Sheets, Nos. 26 to 28	6¼¢
Best Bloom Sheets, Nos. 22 to 25	6½¢
Best Bloom Sheets Nos. 16 to 21	6¾¢
Common Red Plates, 3-16 to 16	3.2¢
Best Bloom, Galvanized, discount	40 %
Second quality, discount	50 %

Wrought Iron Pipe.—There has been no improvement in the market since our last writing. Demand still continues light, and prices are a trifle weaker. This increased weakness is said to be owing, in the main, to the urgency on the part of dealers and jobbers to realize. Small sizes are scarce, but not to such a degree as to cause any advance in quotations. For ordinary lots we quote as follows: Discounts on Boiler Tubes, 60 %, and on Gas and Steam Pipe, 70 %.

Steel Rails.—There is no change whatever. Buyers for winter and spring are disposed to take their chance of the market, and, as the mills are full of work for summer, neither party seems inclined to force business. Summer deliveries in lots of 500 to 1000 tons each command $38 @ $39 at mill, and although $36.50 is bid for large lots, winter delivery, sellers at the moment are not prepared to go much below $38, although it is believed that sales have been made at $37 @ $37.50.

Nails.—A strong feeling pervades the Nail market. Demand is good and likely to continue so for some time to come. Stocks are light and assortments much broken. Manufacturers appear to have more than they can do; $3.10 ℔ keg is the usual selling price for small lots, and $3 may be given as the bottom price for large lots.

PITTSBURGH.

Office of *The Iron Age*, 77 Fourth Avenue, PITTSBURGH, PA., July 10, 1883.

While as yet there has been no actual improvement in the general Iron trade, a much better and more cheerful feeling has been developed during the past week, caused in part by the more favorable weather, which is all that could be desired for the growing crops and for harvesting, which has been commenced in this section of the country. The crop reports are becoming more and more favorable as the season advances, and, with the exception of winter wheat, there is every indication of a bountiful yield, and that farm products will rule at a reasonable price. It is worthy of mention that our manufacturers generally are looking forward to a good fall trade, and are making preparation to meet it. No particular boom is expected nor desired, but there is every indication of a good, healthly, legitimate business, and there is no reason apparent at present why it should not be realized.

Ore.—The Ore market continues very dull and depressed, and no improvement can be looked for until there is a change for the better in the Pig Iron market and some of the many idle furnaces are started up. This has been the worst year thus far the Ore companies have had for several years, and the prospect, owing to an excessive supply, is not very bright for an early improvement in price.

Pig Iron.—While, as already intimated, there has been no improvement in the volume of business, a better feeling has been developed during the past week. It now appears to be generally admitted that the market has reached hard pan, and, this being the case, consumers, while in no immediate need, are more disposed to treat with sellers with a view to ascertaining what particular brand they have to offer and the price. The stock of first-class Iron it not large, and it is surmised that there are some mill owners apprehensive of an advance and who are disposed to anticipate future wants in consequence. This improved feeling has, as might be expected, made furnacemen less anxious to sell. Your correspondent is reliably informed that some of the city furnaces are loth to accept additional orders at ruling prices, while furnaces tributary to this market, both east and west, can do better elsewhere than here. While we repeat former quotations, it is doubtful whether large orders for first-class brands could be placed at them, as furnacemen have stiffened up considerably, although as yet consumers are not prepared to pay any advance. It is possible that there may be some considerable business before the close, although the probability is that consumers generally will hold off another week or two. We quote as follows:

No. 1 Foundry	$20.50 @ $21.00,	4 mos.
No. 2 "	19.00 @ 19.50,	4 "
Neutral Mill	17 50 @ 18.00,	4 "
Red-Short Mill	18 50 @ 19.00,	4 "
Warm-Blast Charcoal	25.00 @ 27.00,	4 "
Cold " "	28.00 @ 35.00,	4 "
Bessemer Iron	21.00 @ 21.50,	4 "

We can report some small sales of Bessemer at $21.50, 4 mos.

Muck Bar—Continues quiet; but little offering, and not much call for it. In the absence of sales we repeat former quotations, $34 @ $34.50, cash. It is expected that there will be an increased demand within the next week or two.

Manufactured Iron.—The Bar trade continues unsatisfactory, particularly in regard to price. Some mills are refusing to sell below a 2¢ base, but there is no difficulty in placing good assorted orders at 1.9¢, and we occasionally hear of sales as low as 1.85¢ and 1.8¢. The Sheet trade is improving, one mill having received an order from New York a few days ago for 2000 bundles. No. 24 is quoted at 3.6¢. The improvement in Pipe will no doubt lead to an increased demand for Skelp Iron. A number of the mills are stopped—taking stock and making repairs. The regular quarterly meeting of the Western Iron Association takes place on the 11th.

Nails.—The demand has slackened up somewhat, as it always does about the 1st of July, but the factories still have about all they can do; some of them as yet have not caught up with their orders. Prices steady at $3, 60 days, 2 % off for cash, with usual abatement of 10¢ ℔ keg on carload lots and upward. The regular monthly meeting of the Western Nail Association takes place to-morrow, at which some action will be taken in regard to shutting down for a few weeks. Some of our manufacturers are anxious to shut down a week or two to take stock and put their factories in condition for the fall trade, which promises well, and will open about the first of next month.

Wrought Iron Pipe—There has been a decided improvement in the demand during the past week. Some of the mills have now about all they can do, and while as yet there has been no improvement in prices, they have stiffened up, and if the present demand is maintained, an advance soon may be looked for. Discount on Gas and Steam Pipe still quoted at 70 and 10 %, and on Boiler Tubes, 55 @ 60 %; Oil Well Casing, 45¢ ℔ foot; do. Tubing, 14¢ @ 15¢. National Tube Works stopped last week to take stock.

Old Rails.—The market is firmer, with some inquiry, and but few offering. We quote American Tees at $23 @ $23.50; last sale reported was at $22.50. One of the largest consumers here stated publicly the other day that he would pay $23, and, this being the case, $23.50 might be obtained—that is, for good straight lots.

Steel.—The Merchant Steel trade continues quiet, but the outlook is regarded as being favorable for a good fall trade. The mills of Singer, Nimick & Co. and Smith, Sutton & Co. have been stopped for repairs, and it is probable those of Hussey, Howe & Co. and Park Bros. & Co. will do likewise soon.

Steel Rails.—The market is stiffer, with considerable inquiry, and mills, being well supplied with orders, are indifferent about making additional contracts. We continue to quote Heavy Sections at $38.50 @ $39, cash, at mill. One of our mills had to decline an order a few days ago for August delivery, being unable to meet it.

Railway Track Supplies.—Spikes remain unchanged at 2.6¢, 30 days; Splice Bars, 2¢; Track Bolts, 3¢ with Square and 3.2¢ @ 3.25¢ with Hexagon Nuts.

Crop Ends—Continue quiet, with prices nominally unchanged. The last sale reported was at $25 ℔ gross ton, which appears to be regarded as the ruling price.

Scrap.—Wrought Scrap is quoted at $21 @ $22 ℔ net ton for Mixed lots, and $1 @ $2 additional for Selected Railway. We hear of a sale of 600 tons of the latter at $26 ℔ gross ton. Nothing doing in Wrought Turnings or Car Axles. Old Car Wheels continue very dull, and Mixed lots may be quoted at $20.50 @ $21, gross. A small lot of Standard Wheels was sold recently at equal to $22.50, cash. Cast Borings are still quoted at $13 @ $14, gross.

Coke.—Manufacturers report a firmer feeling, and there are intimations of an intention to put up prices in the near future, but it will be some time before this interest will be where it was a year ago, when there was a demand equal to the entire production of the Connellsville region. At present it is estimated that about one-third of the ovens are idle; still the production is equal to present wants, and it is the desire of manufacturers to prevent an accumulation. Prices remain as last quoted, 90¢ ℔ ton, delivered free on cars at ovens.

Window Glass.—There is a fair business, and manufacturers look for a good fall trade, which ought to open up pretty lively next month. No change in prices.

CHICAGO.

Office of *The Iron Age*, 36 and 38 Clark St., cor. Lake St., CHICAGO, July 9, 1883.

Hardware.—Trade continues fair, and dealers anticipate an increased activity in the near future; quotations continue firm.

Nails.—We have no change to note in the Nail market; quotations are firm at $3.05 @ $3.15 ℔ keg for 10d. to 60d., according to quantity, with the usual 2 % off for cash.

Manufactured Iron.—As previously reported, the market continues without change, the demand being considered good and quotations firm. We quote Bar, 2.15¢ @ 2.25¢ rates; Angle, 3¢ @ 3.2¢ rates; T Iron, 4¢ rates; Beams, 3.8¢; Channels, 4¢; Sheet Iron, 9 to 14 gauge, at 3¢ rates; 15 to 17 do., at 3.3¢; 18 to 21 do., at 3.6¢; 22 to 24 do., at 3.8¢; 25 to 26 do., 4¢; 27 do., 4.2¢. These quotations would be shaded 1-10¢ @ 2-10¢ ℔ ℔ on large lots. Norway Original Bars, 4¼¢ rates; Norway Rerolled Bars, 5¼¢ rates; Ulster, 4¼¢ rates; Low Moor Iron, 8¢ rates; Nuts and Washers, 8½¢ off list; Wrought Boat Spikes, 2.9¢ rates.

Pig Iron.—Indications denote an increased activity in this market. Buyers are placing their orders more freely than heretofore, and quotations, as a rule, are firmly adhered to, dealers showing very little disposition to make concessions. Southern Coke, as heretofore, continues in excellent request. For Scotch Imported, stocks of which are light, the demand is fair and quotations very firm; we quote $27 @ $28. Lake Superior Charcoal, Nos. 1, 2 and 3, $23; Nos. 4, 5 and 6, $24.50; Briar Hill, $24; Himrod, $23; Crane, No. 1, $25; No. 2, $24; Thomas, $24 @ $25.50; American Scotch, $22 @ $25; Du Val, No. 1, $23.50; No. 2, $22.50; Fulton Notch, No. 1, $22.50; No. 2, $21.50; Calumet, $22 @ $23; Southern Coke, No. 1, $23; No. 2, $22.35; Low Moor, No. 1, $24; No. 2, $22.75, 4 mos.; Silvery Soft, $21 @ $22.

Steel.—We have no change to note in this market, which is quiet. A good trade is, however, confidently anticipated in the near future. We quote Tool, 11½¢; Machinery O. H., 5¢; Crucible Machinery, 7¢; Hammer, 2 inches and under, 8¢; over 2 inches, 9¢; Cast Spring, 6¢, and O. H. Spring, Tire and Sleigh Shoe, 5¢; Sheet, first, second and third quality, 12¢, 10½¢ and 8½¢ respectively; Crucible Plow, 6¢; Eagle Plow, 5¢; Iron Center Plow, 9¾¢, and Soft Steel Center Plow, 9¾¢; Cast Plow, 5¢; German Plow, 4½¢.

Scrap Iron.—The market for Scrap of all kinds indicates no improvement, the inquiry continuing light. We quote as follows, which are dealers' purchasing prices: No. 1 Country Wrought Scrap, ℔ net ton, $17; No. 1 Cast Scrap, ℔ ton, $15; No. 1 Stove Plate Scrap, ℔ ton, $10; Machine Shop Wrought Turnings, ℔ ton, $9; Cast Iron Borings, $7; Old Plows and Plow Steel, $11; Malleable Scrap, $5.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of July 7, 1883: *Connellsville Foundry Coke.*—There is a very good demand for Prime Foundry Coke, and there is a tendency toward higher prices. Market closes quiet but very firm at $5 @ $5.15, according to quality and delivery. *Pig Lead.*—Since our last circular very little of interest has transpired in the Pig Lead market. Sales of 200 tons Refined have been made at $4.20, and 200 tons at $4.15; also 300 tons Common at $4.15. The market closes dull and featureless, with very light demand.

CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Sts., CHATTANOOGA, July 9, 1883.

The weather has been very hot and rather dry during the week. Naturally there is a lull in general trade following the Fourth of July frolicking, and the intense heat does not tend to enliven affairs; yet there is no unusual dullness visible. The remarkable appearance of activity is mostly attributable to the extraordinary amount of building in progress in every part of the South. There are a great number and variety of small and large manufacturing establishments under construction, their owners expecting to be ready for operation when the better times of the fall and winter open. These activities and that of the lumber trade have served to absorb nearly all the labor thrown out by dullness in the Iron business, bracing and strengthening general business in every way and direction. Crop reports become more favorable as the summer progresses. One of the most hopeful signs of speedy coming Southern commercial independence may be found in the fact that the number of large dealers in corn, pork, hay and general farm supplies is yearly becoming less. Several have wound up and quit for want of patronage. The South is making its own bread and meat. This ought to encourage manufacturers of cotton, Iron, &c., to locate in this region of raw materials, for they can now secure cheaper living and fresher supplies for man and beast than when these had to be drawn largely from the North. This year the Southern section will buy very sparingly of food supplies from north of the Ohio, though we have sent to that region not less than $1,000,000 worth of early fruits and berries and as much more in vegetables, early lambs, &c. These are hopeful omens, or hopeful facts, rather.

Pig Iron.—Nothing in the market here indicates that it has been in the least affected by the slight advance in Eastern cities. It is possible holders of high grades here are a shade firmer in their views—would be less inclined to concede than they were a few weeks ago—and that is all. Lower grades are weak. There is much material that can be substituted for Muck Bar, and it does not seem to decrease much. To sell any large lots of Gray Forge or White and Mottled, quotations would have to be shaded at least $1 ℔ ton. We continue to quote No. 1 Foundry, $19 @ $20; No. 2 Foundry, $18 @ $19; Gray Forge, $16 @ $19; White and Mottled, $14 & $15; Car-wheel Metal, $24 @ $26.

Ores.—We quote 50 % Brown Hematite, ℔ ton, $2 @ $2.75; Red Fossil, $2 @ $2.25, delivered at furnace.

Miscellaneous Articles.—Old Rails continue dull at $22; Wrought Scrap, $18 @ $22; Cast Scrap, $11 @ $14; Old Wheels, nominal, $22.

Nails.—The Nail market is in very satisfactory condition. We quote them at $3, carload lots, and steady; 10¢ @ 15¢ higher for job lots.

Manufactured Iron.—Bar is dull at $2, round lots, assorted sizes; Railroad Spikes, $2.70; Track Bolts, $3.20; Fish Plate, $2.

Coal.—We quote Fancy Lump, $3; Common, $2 50; run of mine to manufacturers, $1.75 at mills.

Coke.—We quote Furnace Coke, $3 at point of consumption; Foundry, 10¢ @ 12¢ ℔ bushel.

LOUISVILLE.

GEO. H. HULL & CO., Commission Merchants, report as follows, under date of July 7, 1883: The market is quiet, but some moderate-sized sales have been made at private figures. Prices believed to be under quoted figures. We continue quotations as below, which are for cash:

FOUNDRY IRON.

No. 1 Hanging Rock Charcoal	$25.00 @ 26.00
No. 1 Southern Charcoal	21.50 @ 22.00
No. 1 Hanging Rock Stonecoal and Coke	20.50 @ 21.00
No. 1 Southern Stonecoal and Coke	20.50 @ 21.00
No. 2 " " "	19.00 @ 19.50
" American Scotch "	19.00 @ 20.00
Open Silver-gray	18.00 @ 19.00
Close "	17.00 @ 18.00

MILL IRON.

No. 1 Charcoal	20.00 @ 20.50
No. 1 Stonecoal and Coke, Neutral	18.00 @ 18.50
No. 2 " " "	17.00 @ 17.50
No. 1 " " Cold-short	17.50 @ 18.00
No. 2 " " "	16.50 @ 17.00
White and Mottled, Cold-short and Neutral	15.50 @ 16.00

CAR WHEEL IRONS.

Hanging Rock, Cold-blast	32.00 @ 35.00
" Warm-blast	25.00 @ 27.00
Alabama and Georgia, Warm and Cold-blast	27.00 @ 28.00
Central Kentucky, Cold-blast	25.00 @ 28.00

W. B. BELKNAP & Co., Iron and Steel Merchants, Nos. 115 to 121 West Main street, report to us as follows, under date of July 7, 1883: The Bar Iron market is entirely devoid of animation. Mills are shutting down, ostensibly for repairs, but such as continue to run are making concessions to fill their books for July. Stocks over the country in the hands of jobbers, however, are light, and we predict that toward the last of the month there will be more buyers in the field than at present. Hoops and Bands are especially dull. Sheet Iron is low again, having lost its advances. Nails are holding their own fairly under the care of the association. They are bolstered up every now and then by promise of general stoppage. The dates proposed, however, seem to have an indefinitely extensible quality, and one never knows whether they are not set simply to stimulate trade. *Fence Wire.*—The question of paying royalty any longer, and if any, how much, is still unsettled, and so affects the market. Prices are lower than ever before known on these goods. Quotations may be made as follows: Bar Iron, 2.10¢ @ 2.25¢; Heavy Sheet, 3¢ @ 3.10¢; Light Sheet, No. 27, 3.90¢ @ 4¢; Nails, $3.10 @ $3.25; Barb Wire Galvanized, 7.25¢ @ 7.50¢; Painted, 1¢ less ℔ ℔; Kelly Axes, $7.75; Burden Horseshoes, $4.50 @ $4.75; Juniata Horseshoes, $4.25 @ $4.50; Screws, discount 50 and 10 %.

CINCINNATI.

JULY 2, 1883.—*Pig Iron.*—The market through the past week has shown no new features further than it seems to be agreed between producers and consumers that the good and better grades have touched the bottom in prices. Requirements for consumption draw liberally on stocks on hand and the production of all grades. Best Hanging Rock C. C. Foundry, $25; Good, No. 1, $24.50; No. 1 Southern, $21 @ $22.50; No. 2, $1 less; Best Hanging Rock Coke, $21.50 @ $22; Southern, $20 @ $21; No. 2 and 3, $1 and $2 less; American Scotch, Best No. 1, $22; Good No. 1, $21; No. 2, $1 less; No. 3, $2 less; Softeners, Best No. 1, $21; Good, $20.50; Fair, $20; No. 2, $19; No. 3, $18.50; Forge, $17 @ $22, including the range Stonecoal, Coke and C. C. The volume of trade in all branches of Iron is large now at remunerative prices.

ST. LOUIS.

HOFFER & CO., Pig Iron and Iron Ore Merchants, 214 Pine street, report to us as follows, under date of July 7, 1883: The market remains unchanged. Quotations are:

HOT BLAST CHARCOAL IRONS.

Missouri	$20.00 @ 2 .10
Southern	20.00 @ 21.00
Ohio	25.00 @ 26.00

COAL AND COKE IRONS.

Missouri	20.00 @ 20.50
Southern	18 50 @ 20.00
Ohio	20.00 @ 25.00

MILL IRONS.

Red Short	18.50 @ 20 00
Neutral	17.00 @ 18.00

CAR WHEEL AND MALLEABLE IRONS.

Missouri	21.00 @ 22.00
Southern	25.00 @ 26.00
Ohio	23.00 @ 32 00

RICHMOND.

ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows, under date of July 9, 1883: The large export of leading Virginia furnaces to Northern markets is attracting considerable attention. One furnace is shipping 1000 tons per month. Market firm and unchanged.

No. 1 Scotch Pig Iron	$21.00 @ 26.50
No. 1 Anthracite Pig Iron	21.00 @ 23.50
No. 2 " "	20 00 @ 22 00
No. 1 Virginia Coke Pig Iron	20.00 @ 22.50
No. 2 " "	19.00 @ 21.00
No. 3 " "	18.00 @ 19.00
White and Mottled	16.00 @ 17.00
Virginia C. B. Charcoal	26.00 @ 28.00
Old Dom. Nails (carlo d lots)	3.00 @ .....
" Refined Bar Iron (base)	2 2-10¢
Old Iron Rails	21.00 @ 22.00
Wrought Scrap, No. 1	20.00 @ 21.00
Cast Scrap, No. 1	16 00 @ 18.00
Horse Shoes (Tredegar)	4.25 @ .....
Mule "	5.25 @ .....

BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of July 9, 1883: Notwithstanding the excessively hot weather that prevailed last week, there was an unusually fair to active trade transacted, though values are seemingly declining and shaded for desirable specifications.

Ref. Bar Iron, 1 to 6 x ⅜ to 1	℔	2¼ @ 2.30¢
" " 1 to 4½ x 2½ to 1	℔	2¼ @ 2.35¢
" " ¾ to 1, Round and Square	℔	2¼ @ 2.35¢
Hoop Iron, 1½ wide and upward	"	3 2-10 @ 3 3-10¢
Band Iron, from 1½ to 6 in. wide	"	2 7-10 @ 2 8-10¢
Horse-shoe Iron	"	3¼ @ 3½¢
Norway Nail Rods	"	5¼ @ 5½¢
Black Diamond Cast Steel	"	11 @ 12 ¢
Machinery Steel	"	4½ @ 5 ¢
Spring Steel	"	4 @ 4½¢
Common Horse Nails	"	10 @ 11 ¢
Railroad Spikes, 5½ x 9-16	"	2 6-10 @ 2 7-10¢
Perkins' Horse Shoes, ℔ keg of 100 ℔		$4 37½
" Mule Shoes		5 37½

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From Our Regular Correspondent.)

LONDON, ENG., JUNE 25, 1883.

THE SITUATION

has not undergone any change of importance since the date of my last advices, although there have been a few variations, to be presently alluded to, in the condition of two or three branches of the iron trade. As I mentioned last week, however, the end of the quarter has not been without its customary influences, a prominent feature of the past few days having been the emphasized reluctance of buyers to enter into new contracts at the higher rates which certain of the producers have persuaded themselves they are in a position to obtain. Merchants are showing unusual caution in this respect, their experience of the past having proved more than sufficient to prevent them from being "taken in and done for" by the efforts of the manufacturers to infuse a semblance of activity into things just prior to the quarterly meetings. This is a somewhat stale piece of stage business on both sides, and its effects are pretty certain to be *nil*, both parties being much too wide awake to forestall themselves in the manner tried on by each for the benefit of the other side. So far as an impartial outsider is in a position to observe, there is absolutely no reason whatever for attempting to secure an advance in any description of manufactured iron; hence, the attempts of the sheet-iron men and a few others to obtain more money for their products are little short of amusing—just as is the course of procedure of buyers in the other direction. So far as I can see, the *status quo ante* must be maintained at, and for some time after, the quarterly meetings, unless some new and decided phase should arise and upset all present calculations. Of such a contingency there does not appear to be the most remote probability, nothing in our home or foreign advices affording ground for such an alteration. The time has now passed when large American orders for shipments, just in time to reach your side after the 1st of July, might have been placed, and it appears to be quite futile to look for such favors on a large scale so long as your market is in the dull and lethargic condition spoken of in current mail and cable advices. Great expectations to that end had been entertained in some quarters, but, with a few minor exceptions, I fancy they have all been woefully disappointed. It may be, of course, that the orders have been withheld pending the advent of the new tariff and decisions on certain moot points, but of that I am in no position to form an accurate opinion. I do know, however, that certain exporters as well as manufacturers here (in different parts of

Great Britain, that is to say) have sent over sample lots of articles, such as galvanized iron, sheets, wire rods, puddled bars and so on, as to which the new rate of duty is not quite so clear as it might be. The decisions of your customs officials or Treasury authorities will be obtained as promptly as may be respecting these articles, and the results will be cabled over to the parties interested on this side of the Atlantic. Should the more favorable rates of duties be established, matters now in doubt would be cleared up, and exporters here, as importers with you, would know exactly at what prices they could sell at in the States. Of these decisions you will no doubt be informed some time prior to the receipt of this letter. I happen to know that written "cases" had been prepared in some instances by the several parties concerned, but your Government officials declined to entertain them, stating their intention of reserving all decisions until actual shipments were received, when they must necessarily "lay down the law." Whatever these decisions may be, I don't think you need fear excessive shipments of British iron of a speculative nature. Pig iron would be the most likely article for what we call "consignments"—that is to say, shipments sent on speculation—but that happens to be a grade of iron respecting which the new tariff is most specific and clear, so that all that could be known in respect to it was learned a long time ago. Of manufactured iron, a few light lots may possibly be sent, such as hoops, wire rods and sheets, but it is not the practice of manufacturers thereof to do a risky business, and I should certainly be of opinion, for many obvious reasons, that they will not depart from their rules in this instance. Apart from these aspects of the case, our iron men would be glad to have better news from the United States, where, they are now inclined to believe, business is in reality much better than it is represented to be by the ordinary channels of information. It is thought, indeed, that your people have been "playing the fox" in order to upset the calculations of the Britishers, and so as to get the pull of the new tariff advantages—such as they are—before their rivals have had a chance of securing a foothold anew.

From other parts of the world our advices are fairly good, but not brilliant, none of the Continental iron trade centers being busy. At the same time it should be noted that they are mere reflexes of British trade facts, and need not be relied upon for that reason. Colonial advices are moderately good, especially those from the Australias and the East Indies, while matters at the Cape of Good Hope (which had been very bad indeed) are distinctly improving. With China trade is paralyzed by the prospect of a war between France and Tonquin, which would most likely induce China to become a combatant. At home there is no alteration worthy of notice. The weather has been fairly good, although there have been several showery days, which have been of great value to the cereal and root crops, although they to some extent hindered the haymakers in the early districts where grass-cutting has been commenced. These showers, I understand, have been general over the greater part of Central and Western Europe, and in some places have been exceedingly heavy. The grass crops are everywhere good, however, and as the weather has now again become fine there is every likelihood of the hay being secured in a favorable manner. On the whole, therefore, agriculturists have a fair outlook, and are being encouraged to purchase implements, tools, &c., on a somewhat freer scale. Every one must hope that a good harvest may follow, and so help the long-suffering farmers to regain something like their old position.

THE IRON MARKET

is again without especial change to note, particularly in almost all kinds of crude irons, in which the amount of current business is relatively very limited. The total output is as large as at any former period, perhaps larger than ever, and is necessarily rendered heavier, owing to the low values obtained. The tendency of the times is all in this direction. Every furnaceman feels compelled to force his means of production to the utmost possible extent in order that he may bring down the cost per ton, in which attempt he is no doubt successful, but his success is only attained by sacrifices in other respects. Values are kept at a sacrificial level, to begin with, and the market is overstocked with iron. It is thus not by any means clear whether the game is worth the candle, yet the practice obtains and is quite general, so that we are compelled to adopt the inference that it pays somebody or other to work on this basis. At the same time, there are many sound practitioners who doubt the wisdom of such a course, and who would like to make less and sell for more, did the necessities of their position permit of the adoption of such a policy. The question, however, is one which cannot be settled by any hard-and-fast rule, but must be solved by circumstances. These are not now favorable to the small men, and I should not be surprised to hear of new catastrophes among that class, for the simple reason that all modern business favors concerns with large capitals and large plants, and tends to crowd out the little man. For the same reason the middleman suffers, and must have had a poor time of it latterly. As things are now, the only chance the middleman has is where he has a large amount of capital at command, and is thereby enabled to beat down the small producer, and so is enabled to meet the large makers on even terms. He is, indeed, a "farmer" of small makers, and so becomes a large man on his own account.

At Glasgow the range of warrants has been extremely limited, varying from 46/10 to 47/1 for cash, while some of the makers' brands are a trifle easier. Shipments have been lower than for the corresponding week of last year, while the stocks in Connal's stores are increasing rather rapidly—the latter change having been principally caused by the much larger use of Middlesboro' pig iron in the Scotch foundries. This traffic now compares very favorably with last year, and does not appear to have been checked in any appreciable measure by the sale of the Scotch No. 3 brands. The imports of Middlesboro' pig iron into Scotland are controlled almost exclusively by one leading Glasgow firm, reputed to be one of the wealthiest in the trade, who are also interested in two or three of the Scotch ironworks, so that they are doubtless in a position to work in either class of iron just as it best suits their own interests. In Scotch pig they are reported to be always "bears," for which purpose they no doubt find their Middlesboro' "whip" very useful as occasion serves from time to time. At Middlesboro' there has been no quotable change in values, No. 3 being about 39/ and other numbers *pro rata*. In some quarters there are reports of greater firmness, while from another equally good source my information is to the effect that the market is slightly easier. Taking an average, I arrive at the opinion that things are virtually unchanged. The local consumption is still heavy, and the shipments are very good, yet the market lacks tone, and there is little likelihood of a marked change, either up or down, within the next few weeks. West Coast hematites are nominal at 50/ @ 51/ for mixed parcels of Nos. 1, 2 and 3, but makers' brands are purely nominal all round. Elsewhere crude irons are dull, and are as of late in value. Heavy manufactured iron is in large output, especially ship, boiler and armor plates, for which all the leading firms have an abundance of orders in and on hand. Lloyd's authorities have again called attention to the imperative necessity of ship-plates being of high quality, but as the matter had been anticipated by all the best plate manufacturers, the warning is not likely to have an injurious effect on this important branch of the trade. Merchant iron is absolutely the same, except sheets, some grades of which are reported to be in better demand at higher rates. A few of the better-known makers of sheets are said to have put up their prices by 5/ or so ℔ ton, but I am assured that the advance is not only partial, but is not being secured, as a rule. The greater firmness of black sheets arises to a great extent from the improved call for galvanized iron, as also from better buying by the tin-plate houses. Marked Staffordshire bars are £7. 10/, and all other kinds exactly as at any time these several months past, but all prices are nominal and quite "without engagement." Special quotations are obtainable for almost every order in the market. Welsh bars are £5. 10/ @ £5. 12/6. Bessemer blooms are neglected, but there is a moderate call for rail ends and bloom ends. Old rails are reported steady, with holders still disinclined to accept current offers. Heavy wrought scrap is in rather better request for No. 1 assortments or American assortment, but freights stop shipments from London, &c. Steel rails are called £4. 15/ @ £5, and that represents average values. Some of the mills are full over the whole of 1883 and do not want more orders, while two or three works require filling up, and will book August, November or December at lower rates.

SCOTCH PIG IRON

is without animation, consequent upon the continued abstention of the public from investments in warrants and the more unfavorable statistical position. Warrants are now at a lower level than last year same date, but are rather better than in 1881, although the reserve stock is heavier now than then. Messrs. William Colvin & Co., Glasgow, advise me as follows respecting prices, shipments and the comparative statistical position:

(Deliverable alongside.)			No. 1.	No. 3.
Gartsherrie, at Glasgow,	"	"	57/6	53/6
Coltness,	"	"	60/	53/6
Langloan,	"	"	60/6	53/6
Summerlee,	"	"	58/	50/6
Chapelhall,	"	"	57/6	54/
Calder,	"	"	58/6	50/6
Carnbroe,	"	"	54/6	49/
Clyde,	"	"	50/6	48/6
Monkland,	"	"	48/3	46/3
Quarter,	"	"	47/6	45/6
Govan, at Broomielaw,	"	"	48/3	46/3
Shotts, at Leith,	"	"	60/6	56/
Carron, at Grangemouth,	"	"	48/6	47/
Do., do. (spec. selected),	"	"	54/6	....
Kinneil, at Bo'ness,	"	"	49/	47/6
Glengarnock, at Ardrossan,	"	"	54/6	48/
Eglinton,	"	"	48/	44/6
Dalmellington,	"	"	48/6	47/6

Shipments, week ending 16th June, 13,255 tons, 2053 tons under same week last year.

COMPARATIVE STATEMENT.

	1883.	1882.	1881.
Shipments from Christmas to date	287,126	289,555	252,812
Furnaces in blast at date	114	108	120
Price of warrants at date	47/	48/	46/7
Stock in Glasgow store at date	583,801	637,526	564,032
Shipments from Christmas to date	1880. 360,240	1879. 245,110	1878. 192,031
Furnaces in blast at date	116	90	92
Price of warrants at date	42/9	41/2	50/1½
Stock in Glasgow store at date	447,247	273,317	177,746

Imports of Middlesboro' pig iron into Grangemouth, week ending 16th June, 5280 tons, 3030 tons over same week last year; total increase this year, 23,960 tons.

MIDDLESBORO' PIG IRON

is quiet, and presents no features showing the probability of any early change for the better. The make is heavy, and is probably quite equal to the consumptive and shipping demands, both of which are large. For No. 3, 39/ @ 39/3 is the average open quotation, but a shade below 39/ is said to have been accepted, and there are rumors of forward sales at 38/9 @ 38/10½. For G.M.B., f.o.b. makers' wharves in the Tees, net cash, less 2½ % discount on 10th of following month, present rates are:

No. 1 Foundry	43/3	Mottled	37/9
" 2 "	41/3	White	37/3
" 3 "	39/ @ 39/3	Refined Metal	55/
" 4 "	38/9	Kentledge	40/
" 4 Forge	38/3	Cinder	34/

The restriction agreement is now on the point of expiring, and, it is assumed, is scarcely likely to be renewed. For one or other reason it has almost become inoperative, and is now simply a nominal arrangement.

WEST COAST HEMATITES

remain almost quiescent, with no purchases of any moment on export account, and few new contracts on the part of home rail mills, or general Bessemer works. Deliveries in fulfillment of old engagements are on a large scale, yet the production continues to be in excess of consumption, and the reserve stock increases week by week. Mixed, Nos. 1, 2 and 3, are held at 50/ @ 51/ ℔ ton, with warrants at 50/6 @ 51/, f.o.b. Workington, and makers' brands as under:

	No. 1.	No. 2.	No. 3.
Cleator	54/	53/	52/
Lonsdale	52/	51/	50/
Workington	51/6	50/6	50/
Lowther	51/6	50/6	50/
Distington	51/6	50/6	50/
Harrington	51/6	50/6	50/
Solway	51/6	50/6	50/
Maryport	51/6	50/6	50/

There are now 56 furnaces in blast, making about 29,000 tons per week. In the West Cumberland stores there 53,707 tons. Last week's shipments included 6845 tons of hematite pig iron and 9544 tons of steel rails.

SOME CURRENT PRICES

likely to interest your readers just now are those appended:

Bright or Annealed Iron Wire, per cwt. of 112 lbs.

Best Iron Wire.

0-6	7	8	9	10	11	12	13	14
11/	11/6	11/9	12/3	13/	13/6	14/	14/6	15/
15	16	17	18	19	20	21	22	
15/9	16/6	17/6	18/9	20/	22/	23/9	25/6	

Best Galvanized Wire.

0-6	7	8	9	10	11	12	13	14
14/9	15/3	15/6	16/	16/9	17/3	17/9	18/3	18/9
15	16	17	18	19	20	21	22	
20/6	21/3	23/3	24/6	25/9	29/3	31/6	34/3	

Best selected wire, 1/9 ℔ cwt. extra on best; best best wire, 3/6 ℔ cwt. extra on best; best charcoal wire, 6/ ℔ cwt. extra on best.

Common Iron Wire.

0-6	7	8	9	10	11	12
10/	10/6	10/9	11/3	12/	12/6	13/
13	14	15	16	17	18	
13/6	14/	14 9	15/6	10/6	17/9	

Steel Spring Wire.

0-6	7	8	9	10	11	12
12/	13/6	13/9	14/3	15/	15/6	16/

Charcoal spring wire, 4/ ℔ cwt. extra; coppered spring wire, 1/3 ℔ cwt. extra.

Bright or Annealed Bright Iron Wire of the Best Charcoal quality, per stone of 14 lbs.

23	24	25	26	27	28	29
4/5	4/7	4/9	5/	5/5	5/8	6/
30	31	32	33	34	35	36
6/4	6/7	7/2	7/11	0/2	10/8	12/2

Common annealed to 26 W. G. 1/ ℔ stone less.

Best Bottling Wire, cut in lengths.

Nos	20	21	22	23	24
Tinned, ℔ ℔	3¾d.	4d.	4¼d.	4¾d.	5d

Best Cast-Steel Wire.

Nos	0 to 6	7	8	9	10	11
℔ ℔	5d.	5¼d.	5½d.	5¾d.	6d.	6¼d
Nos	12	13	14	15		16
℔ ℔	6½d.	6¾d.	7d.	7¼d.		7½d.
Nos	17	18	19	20		21
℔ ℔	8d.	8½d.	9d.	9½d.		11½d.

Best Fencing Wire, Per Ton.

Nos	0-6 £ s.	7 £ s.	8 £ s.	9 £ s.	10 £ s.
Annealed drawn	9 10	10 0	10 5	10 15	11 15
Prepared bright	10 10	11 0	11 5	11 15	12 10
Galvanized drawn	13 10	14 0	14 5	15 0	15 15
Bright or annealed steel (round or oval)	11 5	11 15	12 0	12 10	13 10

Dipping in boiling oil, 5/ ℔ ton extra.

Rolled Fencing Wire, Per Ton.

Plain. Nos.	£ s.	Galvanized. Nos.	£ s.
1-4	7 10	1-4	10 15
5	8 0	5	11 5
6	8 10	6	11 15

Galvanized Fencing Strand.

No.	Seven wires. Price ℔ cwt.	Length ℔ cwt., about, yards.
0	18/9	165
1	19/3	200
2	19/9	245
3	20/3	278
4	20/9	330
5	22/3	460
6	22/9	470
7	24/	600
8	25/9	700
9	26/	780

Machine-Cut Fencing Staples.

Nos	5 & 6	7	8	9
Bright or black, ℔ cwt	11/9	12/3	12/9	13/9

Galvanized, 7/6 ℔ cwt. extra.

Extras, per cwt.

Wire drawn to pattern	0/6
Square wire	0/6
Bessemer steel	2/
Tinning Nos. 0 to 19 hard	9/
Coppered wire	1/3
Half-round wire	8/
Wire cut in lengths	2/9
Wire wound in 1 ℔ and ½ ℔	3/6
Wire wound in ¼ ℔	4/6
Wire wound in 1 oz. and 2 oz., ℔ ℔	0/1
Papering	0/2
Bagging	0/5

Terms of payment, 2½ % cash on monthly accounts. Extra cost of carriage if delivered at Bristol, 9d.; Hull, 1/; Liverpool, 9d.; London, 1/ ℔ cwt, 2 cwt. lots and upward. Extra cost of carriage (in 2-ton lots and upward), Bristol, 10/; Hull, 14/2; Liverpool, 12/; London, 15/ ℔ ton.

Best Drawn Iron Wire (less 2½ % for cash).

B. W. G. Nos.	0-6	7	8	9	10
Bright or annealed, ℔ cwt.	10/6	11/0	11/3	11/9	12/6
Galvanized, ℔ cwt	14/3	14/9	15/0	15/6	16/3
B. W. G. Nos.	11	12	13	14	15
Bright or annealed, ℔ cwt.	13/0	13/6	14/0	14/6	15/3
Galvanized, ℔ cwt	16/9	17/3	17/9	18/3	20/0
B. W. G. Nos.	16	17	18	19	20
Bright or annealed, ℔ cwt.	16/0	17/0	18/3	19/6	21/6
Galvanized, ℔ cwt	20/9	22/9	24/0	25/3	28/9
B. W. G. Nos.	21	22	23	24	25
Bright or annealed, ℔ cwt.	23/3	25/0	26/9	28/0	29/6
Galvanized, ℔ cwt	31/0	33/9	36/6	39/3	43/3

Extras.

	Per cwt.
Charcoal	5/0
Tinned	8/6
Charcoal, tinned	14/6
Charcoal, half round	13/3
Coppered wire	1/3
Spring wire charcoal	6/0
Square wire	1/9
Cut to lengths	2/9
Wire in straight lengths	3/6
Drawn to pattern	c/5
Bessemer steel	4/6
Dudley bagging	0/5
Cotton	0/3
Papering	0/2
Dressing	2/6

Wound in 1-lb. and ½-lb. hanks, 2/9 ℔ cwt. Wound in ¼-lb. hanks, 3/6 ℔ cwt. Wound in 1-oz. or 2-oz. hanks, 1d. ℔ lb.

Small Round and Square Bar Iron.

Inch	¼	7-16	⅜	11-32	5-16	9-32
B. W. G.					1	2
℔ ton	£6. 15/		£7.		£7. 5/	£7. 10/
Inch	¼	7-32	3-16			
B. W. G.	3 & 4	5	6	7		8
℔ ton	£7. 15/	£8. 5/	£8. 15/	£10. 5/		£11. 15/
Inch				⅛		1-10
B. W. G.	9	10		11		12
℔ ton	£13. 15/	£14. 5/		£15. 15/		£17. 5/

Best Rolled Fencing Wire.

Nos	4	5	6
Oiled, £ ton	£7	£7. 10/	£8
Galvanized, ℔ ton	£10. 10/	£11	£11. 10/

Best Drawn Fencing Wire, B. W. G. ℔ ton.

No. 0-6	7	8	9	10	11	12
Annealed and Oiled.						
£9 0	£9 10	£9 15	£10 5	£11 5	£11 15	£12 5
Prepared Bright.						
£10 0	£10 10	£10 15	£11 5	£12 0	£12 10	£13 0
Galvanized.						
£13 0	£13 10	£13 15	£14 10	£15 5	£15 15	£16 10

Annealed or Bright Steel, Round or Oval.

£10 15	£11 5	£11 10	£12 0	£13 0	£13 10	£14 0
No. 0-6	7	8	9	10	11	12

Best Drawn Killed Galvanized Telegraph Wire.

£14 10 £15 10 £15 10 £16 5 £17 0 £17 10 £18 10

In long lengths of 1 cwt. each.

Annealed Tinned Bottling Wire, B. W. G.

No.	18	19	20	21	22	23	24	25	26	27	28
Per 14 ℔	1/5	3/7	3/11	4/1	4/3	4/10	5/4	5/10	6/7	8/1	9/1

Bottling Wire cut to lengths, 6d ℔ 14 ℔. extra.

Best Galvanized Strand, Three-ply.

B. W. G.—No	0	1	2	3	4	5
Yards ℔ cwt	130	210	237	275	340	430
℔ cwt	15/3	15/6	16/3	16/9	17/	17/3
B. W. G.—No	6	7	8	9	10	
Yards ℔ cwt	465	521	745	880	1000	
℔ cwt	18/	18/9	19/3	20/3	22/6	

Best Galvanized Strand, Seven-ply.

B. W. G.—No	0	1	2	3	4	5
Yards ℔ cwt	165	200	225	260	305	395
℔ cwt	16/3	16/9	17/3	17/9	18/3	19/9
B. W. G.—No	6	7	8	9		10
Yards ℔ cwt	465	545	700	800		950
℔ cwt	20/3	21/6	23/3	23/6		26/9

Machine-cut Fencing Staples.

B. W. G.—No	5 & 6	7	8	9
Black, ℔ cwt	10/9	11/3	11/9	12/9
B. W. G.—No	5 & 6	7	8	9
Galvan'd, ℔ cwt.	18/3	18/9	19/3	20/3

Kegs, 1/3 each.

Straining Eye Bolts, with Nuts and Washers, 1¼ x ¼ inch, 3/6; 16 x ¼ inch, 4/6; 18 x ⅛ inch, 5/6 ℔ doz. Galvanized, 2/ ℔ doz. extra.

Best Galvanized Rope Wire. In long lengths.

B. W. G.—No	0-6	7	8	9	10	11	12	13
℔ cwt	13/6	14/	14/3	14/9	15/6	16/3	17/	17/9
B. W. G.—No	14	15	16	17	18	19	20	
℔ cwt	19/	20/3	21/9	23/3	25/3	27/3	29/3	

Above prices are for delivery at works. F.o.b. London, 15/10 ℔ ton extra. F.o.b. Liverpool, 10/ ℔ ton extra.

The following are merchants' prices, subject to the terms and conditions set forth:

CHAINS, CABLES, ANCHORS, RIVETS, WROUGHT NAILS, ETC.

Common Short Link Rigging Chain.

Inch	3-16	¼	5-16	⅜	7-16	½	9-16
Per cwt	22/9	18/6	17/0	15/9	14/9	13/9	13/3
Inch	⅝	11-16	¾	13-16	⅞	15-16	1
Per cwt	13/0	12/9	12/5	12/3	12/1	11/9	11/9

Tested ditto 3d. per cwt. extra.

Best Tested Crane Chain, Short Link.

Inch	3-16	¼	5-16	⅜	7-16	½	9-16
Per cwt	43/0	32/9	24/9	20/9	18/0	16/9	16/3
Inch	⅝	11-16	¾	13-16	⅞	15-16	1
Per cwt	15/9	15/3	14/9	14/9	14/6	14/6	14/6

Best Ship Cables, Stud Links (Maker's Test).

Inch	¾	13 16	⅞	15-16	1	1 1-16 to 1¼
Per cwt	12/2	12/0	11/10	11/8	11/6	11/5

Short Link Cables, Stud Link (Maker's Test).

Inch	¾	13-16	⅞	15-16	1	1 1-16 to 1¼
Per cwt	12/6	12/5	12/3	12/1	11/11	11/10

Stud and Link Cables (Lloyd's Test).

Inch	¾	13-16	⅞	15-16	1	1 1-16 to 1¼
Extra	4/3	3/9	3/9	3/9	3/6	3/6

Trek Tow Chain (made from Charcoal Iron).

Inch	⅜ 7-16
Per cwt	28/6 27/6

Trek Tow Chain (made from Best Iron), Middle Link, assorted sizes, 2 to 10, 12 or 14 Oxen, 18/0 per cwt.

Trek Tow Chain (made from Best Iron), Short Link, assorted sizes, 2 to 10, 12 or 14 Oxen, 18/6 per cwt.

Anchors, Iron or Wood Stocks (Private Test).

Cwt	1	2	3	4	5 to 20	20 to 30
Per cwt	14/3	14/3	14/3	14/3	14/9	15/9

Anchors, Iron or Wood Stocks (Lloyd's Test).

Cwt	1	2	3	4	5 to 20	20 to 30
Per cwt	19/6	17/6	16/6	16/0	15/9	16/9

Carpenters' and Coopers' Wrought Rose Nails, Hand-made.

Inch			1	1¼	1½	1¾	2
Per cwt. (light)			26/6	23/6	20/9	19/9	18/9
" (strong)			23/6	21/0	19/9	18/9	17/6
Inch	2¼	2½	2¾	3	3½		
Per cwt. (light)	18/0	17/3	16/9	16/0	15/9		
" (strong)	17/0	16/3	15/9	14/9	14/6		

Fine Clasp Wrought Nails, Hand-made.

Inch	1	1¼	1½	1¾	2
Per cwt	48/0	39/3	31/6	27/0	23/9
Inch	2¼	2½	2¾	3	3½
Per cwt	21/3	19/6	19/0	18/0	17/9

Best Coopers' Rivets, Hand-made.

Pounds	1	1½	2	2½	3	4	5	6
Per cwt	42/3	34/0	29/6	26/6	24/3	20/6	20/0	19/9
Pounds	8	10	12	14	16	20	30	
Per cwt	19/6	18/9	17/3	16/6	15/3	14/9	13/9	

Rose and Deck Spikes.

Inch	3½	4	4½	5	6	7	8 & up.
Per cwt	14/6	13/0	12/6	11/9	10/9	10/6	10/3

Light, 6d. per cwt. extra.

Galvanized ditto, 3½-inch, 4/3 per cwt. extra, and 4-inch to 8-inch and upward, 3/3 per cwt. extra.

Best Swedish Charcoal Countersunk Horse Nails, Stamped.

Pounds	3	4	5	6	7
Per cwt.	91/6	67/6	60/6	53/6	51/0
Pounds	8	9	10	12	14
Per cwt	49/3	47.6	46/0	43/9	43.0

Or 42½ % discount off Derby list.

Ship and Tank Rivets.

Diameter	¾	5-16	⅜	7-16	½	⅝	¾
Per cwt	18/9	16/6	14/9	13/9	13/0	12/3	11/9

Best Boiler Rivets, 1/ ℔ cwt. extra.

Scupper Nails.

Inch	½	⅝	¾	⅞	1
Per cwt	28/3	24/3	22/0	21/3	20/9

Prices for Back Band and Trace Chains, and every description of Wrought hand-made Nails and Spikes, on application. Above prices are for delivery in London, in 2-ton lots and upward. All goods in smaller quantities than 2 tons, 3d. ℔ cwt. extra on these prices. Above prices include delivery in London and Liverpool.

FOREIGN.

FRANCE.

(*Moniteur des Interets Materiels*)

PARIS, June 24, 1883.—*Metals.*—The weather continuing singularly favorable to crops, the business situation becomes more promising daily, the more so as the demand for railroad material will soon make itself felt under the Government arrangement made with leading lines. Metals have been in request at an advance in all but *Copper*. We quote the latter; Chili Bars, 165 @ 168.25 francs ℔ 100 kg.; Ingots and Slabs, 172.50; Best Selected, 176.25, and Pure Corocoro Ore, 170. Banca *Tin*, 261.75; Billiton, 256.25; Straits and Australian, 255, and English, 252.50. *Lead*, 31.25 @ 32.25, and *Spelter*, 40 @ 40.50. *Iron.*—During the week the market has remained quiet; the work for railroads is looked forward to with impatience. The situation here is not cheerful, but it is not bad enough to lead us to apprehend another period of stagnation. The Metropolitan tramway scheme has been agreed to by the city fathers, and the Government contracts with the great railway lines are before the Chambers, where there is every chance they will pass. As soon as this is done, there will be plenty of work. Meanwhile we quote in this city, ℔ 100 kg.: Merchant Iron, 17.75 @ 18; Charcoal do., 25; Flooring, 18; Sheets, 23 @ 26, and Wire Nails No. 18, bagged, 27. This shows great steadiness. At the North the situation is still a difficult one, since consumers refuse to operate except from hand to mouth. The poor management of leading rolling mills renders the position of small works a very difficult one, so that they cannot make the two ends meet; in fact, Merchant Iron sells there at 16 francs. The Hautmont blast furnace is blown out, and has gone into liquidation. In the Haute Marne there is a flagging of orders; they quote Merchant, 19; Mixed, 20 @ 21; Charcoal, 23 @ 24, and prime do., 26 @ 26.50. In the Loire basin the St. Etienne Sheet works have knocked down the price. In Algeria, the Mokta Co. have bought the Vialoi Iron mines for 450,000 francs. *Coal* is firm, without change.

BELGIUM.

(*Moniteur Industriel.*)

BRUSSELS, June 25, 1883.—*Iron.*—There has been some more inquiry, but prices offered are very low; it does not look as though much of a revival will come before fall. English Pig Iron is weak; it may be had at 5.75 francs ℔ 100 kg. at Antwerp. Foundry Pig still commands 7 francs at Charleroi, while Luxembourg sells slowly at 6. The decline in Coke has adversely influenced the price of Puddling Pig, ranging between the extremes of 4.75 and 5.75; Athus-Halanzy remains steady. Merchant Iron is sustained with some difficulty at 12.50 francs for No. 1; No. 2 at 13.50, No. 3 at 14.50. Beams may be quoted 13, and Corners, 13.50. Sheets are neglected, No. 2 at 17, No. 3 at 19; Commercial, 23; Thin 25, and No. 4 is easy at 27 francs, all ℔ 100 kg. Bridge builders have received some orders for Servian railroads. The import of Iron Ore into Belgium during the first four months of the year has been 470 282 tons, against 385,671 last year, and the export 153,040, against 112,791; the import of Pig Iron, 32,449, against 55,763, and the export, 8387, against 4627. There were exported 14,983 tons of Steel Rails, against none in 1882; 13,372 tons of Sheet Iron, against 11,936; 53,719 tons Merchant Iron, against, 60 691, and 2631 tons of Nails, against 3603. The Cockerill Society has just launched the steamer Princesse Henriette. This is the ninth steamer built by the company for the conveyance of its Iron Ores from Spain and Algeria since 1878, and the tenth will be placed on the stocks forthwith. As these steamers proceed to the countries named and to Italy loaded with the products of Cockerill and Belgian manufactures generally, they contribute powerfully toward stimulating a very profitable Belgian trade in that direction. *Coal* continues to do remarkably well notwithstanding the summer season, and in some classes there has even been an advance during the week. *Coke* is worth 16 @ 17 francs.

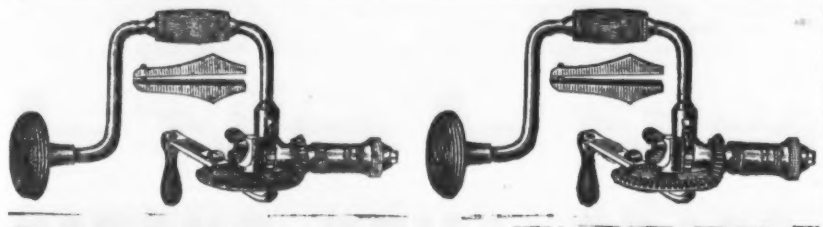
GERMANY.

(*Borsenhalle.*)

HAMBURG, June 26, 1883.—*Iron.*—In Westphalia and the Rhenish provinces there are again threatening indications of an excess of production in Iron industry. The various combinations there have been at war for some time past; thus, for example, the union of Pig Iron producers allowed wire manufacturers 4 marks ℔ ton export premium provided they bought the Iron at their works. On the other hand, the Dortmund blast furnaces for a long time declined to make any reduction, insisting that they depend on the Coke Manufacturers' Union and their high prices. Suddenly the Siegen Blast-furnace Owners' Combination dissolved, for while some of the members swerved from the agreement underhand, it was found that stock was fast accumulating on the hands of those keeping the agreement. In this manner the previous price kept up per agreement at 62 marks, all of a sudden came down to 55; the Ruhr and Emsche people had to follow suit, and with all the more reason since the wire mills are just now in a bad boat. They hitherto did a large trade to Russia and the United States, and as this export has dwindled down to a minimum they have no outlet for the surplus, not being able to get rid of it at home. This changed state of affairs compels them to reduce their output; all of the mills cut down wages at once 20 %. The chances are that they will have to go on curtailing production still further. A considerable portion of Rhenish-Westphalian Ironmasters are dependent upon the Government railroad adjudications, and the entire aspect is a highly critical and problematical one. *Metals.*—Lead has been weak during the week, English Pig at 14.50 @ 15 marks ℔ 50 kg.; Sheets, 15 @ 15.50; German Pig, 13.25 @ 13.50, and Spanish, 16.50 @ 17. Copper without anything doing; Lake Superior at 78, other brands, 71 @ 78; Tin firm at 105 @ 108, and Spelter inactive at 15.25 @ 15.75.

(*Cologne Gazette.*)

DUSSELDORF, June 27, 1883.—*Iron* has become quite dull. Things in the Iron Trade in Germany have commenced to take a very unpleasant turn. The demand for Iron has fallen off to an alarming extent, and, while this is the case, Pig Iron makers underbid each other in a most extravagant manner. Nobody feels inclined to anticipate wants in the least, and the lower prices are put, the shyer the consumer seems to get. Sheets are about the only article in the line still selling. This so far as Iron is concerned. The Steel industry of the country, meanwhile, does well enough. It seems that the Laura Hutte is in treaty for the acquisition of the Thomas-Gilchrist process. We quote to-day, nominally: Prime Spiegel, 64 @ 68 marks ℔ ton; White Pig, No. 1, 55; Luxembourg, 44.60 @ 46; Charcoal Pig, 80 @ 85; Foundry No. 1, 72; No. 2, 68, and No. 3,



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This is our regular No. 32 Ratchet Brace, with a Gear Wheel added to make it take the place of a Breast Drill.

This Wheel has Cut Gears and an extension Handle. It is speeded about four to one, and can be taken off in one second when not needed for drilling.

Thus we have, in one, a Breast Drill, Ratchet Brace and Common Stationary Brace.

The Brace is made of Steel, highly polished and heavily Nickel Plated, with Cocobola Handle and Lignumvitæ Head. It has two sets of Forged Steel Jaws, which will hold square and flat shank tools of all shapes and sizes, and round twist drills from 1-32 to 7-16 inch in diameter. The ratchet attachment enables the Brace to be used in places where there is not room to revolve the sweep.

Many attempts have been made to imitate the outside appearance of our Patent Barber Improved Bit Brace, but no one dares to use our Patent Jaws, as seen in this cut, and no Brace is good without them.

We began to make these Drill Braces six months ago, but after a few thousand were put on the market we made an improvement which doubled their value. While shifting on to the improved kind, we ran out of stock, but hope in future to fill orders in a reasonable time.

We shall advertise these Drill Braces enough to make an inquiry in all Hardware Stores for them. If any dealer lays in a stock and finds that they will not sell, we will take them back at full price. But they will sell wherever shown.

We have never made a more popular tool. **Price, $36.00 per Dozen.**

Discount same as on Breast Drills. Send for Catalogue.

MILLERS FALLS CO.,

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CHAMPLAIN

Forged Horse Nails.

MANUFACTURED BY THE

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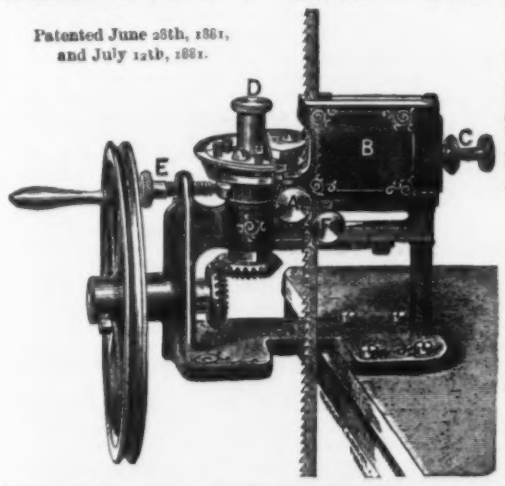
AMESBURY'S BAND SAW FILING MACHINE

Will Save Its Cost in a Few Weeks.

Patented June 28th, 1881, and July 12th, 1881.



Any boy that can turn a crank can file a band saw in from five to ten minutes more accurately than an expert filer can do the same by hand in one hour. Keeps the teeth even and level, and enables the saw to do more and better work with much less strain. Pronounced by users to be the best labor-saving machine ever introduced.

First Premium and Diploma of St. Louis Agricultural and Mechanical Association, 1881, Awarded for

Best Band Saw Filing Machine.

Is sold at a price within the reach of every one using a band saw. *Reduced Price List.*—Net price, including 20 files, $32; thin corner and facing files, per dozen, $1.20; thick beveled files, per dozen, $1.80. Terms strictly cash. Send for Catalogue and Testimonials.

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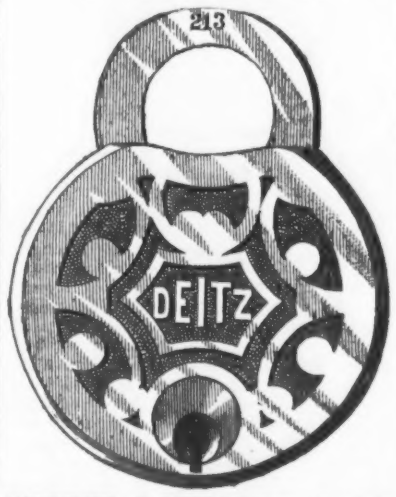

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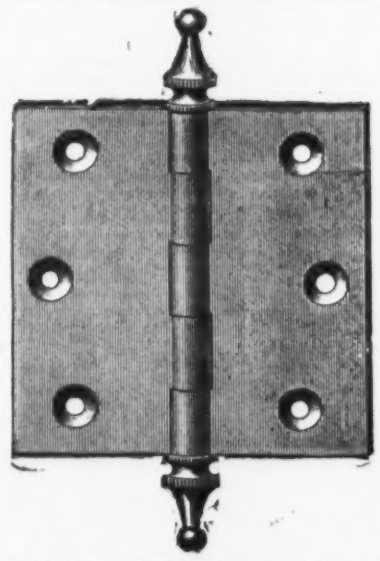

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ESTABLISHED IN 1830.

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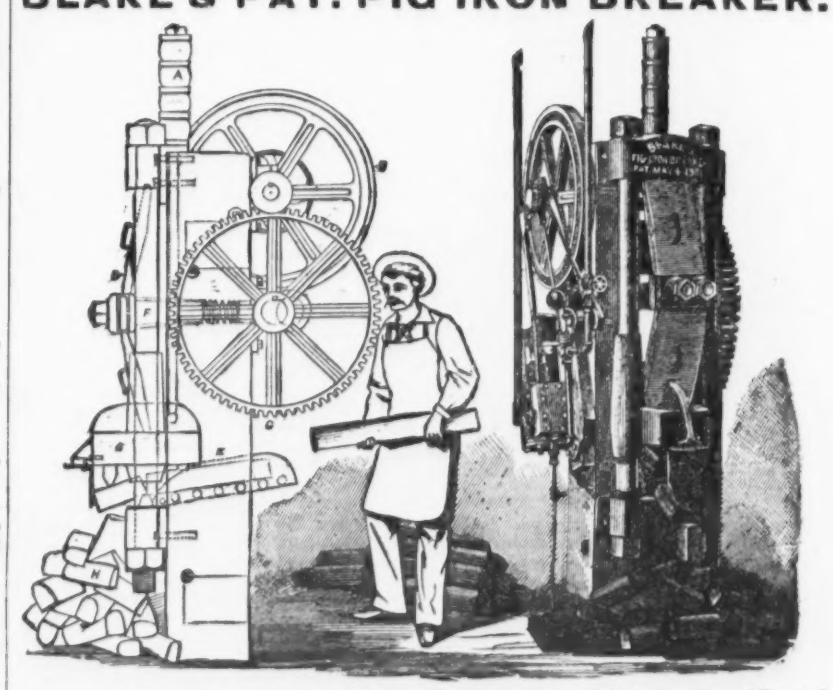
BLAKE'S PAT. PIG IRON BREAKER.



A new and successful machine for breaking pig iron into any length desired, with rapidity and economy. Besides saving in cost of breaking by hand, it secures the greatest economy in melting. Several machines already in use. Every machine guaranteed against breakage of parts. Requires but three horse-power. Can be run by belt or have small engine attached.

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RAILROAD & BUILDERS' SUPPLIES, &c.

ARTESIAN WELL MACHINES.

For our Full Page Advertisement, See First Issue of Each Month.

Steel Castings in Ship and Marine Engine Construction.*

BY WILLIAM PARKER.

(Continued from page 26, June 14.)

It will be observed that in the shaft constructed on Dickenson's principle by J. Spencer & Sons, the webs and pins are made in one casting, while the body part of the shaft is made of wrought iron. With a view to ascertaining the soundness of the casting, I had one of them cut into pieces, as shown by the lines *c c*, and found that the metal was perfectly sound and free from blow-holes. The results of the tests were quite satisfactory. With regard to the other shaft, namely, Turton's patent, made by W. Jessop & Sons, in two castings bolted together, as shown, there are now over a dozen ocean steamers fitted with shafts of this description, some of them having run over a distance of 50,000 miles, and to all appearance they are in perfect condition. Although many of these have not yet been in use sufficiently long to demonstrate their superiority over iron forgings, nor even perhaps their absolute fitness for the purpose intended, yet, as stated, some of them have already withstood sufficient testing by actual work to place the question of their fitness beyond the region of doubt. Again, locomotive axles and cranks have also been in use on the North British Railway for over two years, and up to the present time show no signs of failure.

The question of crank-shafts comes prominently before such a society as that with which I am connected, and, as I have previously stated, the mortality of iron shafts is a very serious matter. Marine engineers have long devoted their serious attention to this point, and there is no doubt that at many forges more care is now taken with this kind of work, better methods of laying

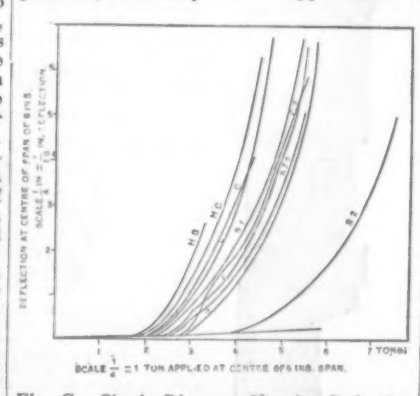
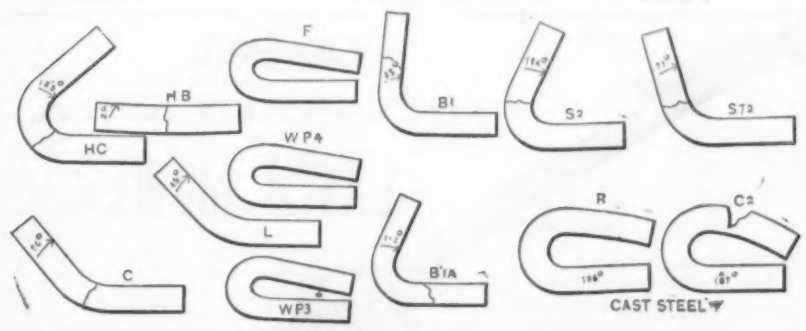

DEFLECTION AT CENTRE OF SPAN OF BARS
SCALE 1/4 IN. = 1/10 IN. DEFLECTION
H B
H C
C
S 2
S 72
SCALE 1/4 = 1 TON APPLIED AT CENTRE OF 6 INS. SPAN.
1 TONS

Fig. C.—Strain Diagram Showing Deflection at Center of Span of 6 Inches During Bending Tests.

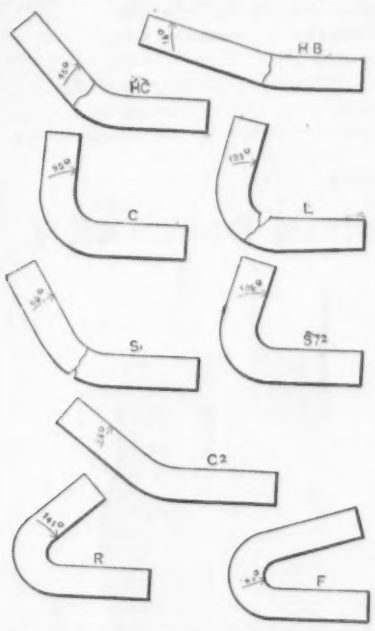
obtainable pressure by a large amount of mechanical work. M. Pourcel, however, contends that it is possible to obtain in steel, by chemical treatment, results equal to those obtainable by mechanical means. With those two exceptions, I believe all eminent metallurgists attach great importance to the thorough forging of the steel they put into shafts. The shafts made by Herr Krupp have, I believe, usually been made of hard



H B—Wrought-iron crank shaft, across grain.
H C—Wrought-iron crank shaft, with grain.
C—Wrought-iron crank shaft, across grain. Thames Iron Works.
L—Wrought-iron crank shaft, with grain. Thames Iron Works.
S 1—Cast steel. Plate ingot.
C 2—Cast crucible steel. Jessop & Sons.
F—Forged crucible steel. Jessop & Sons.
S 72—Cast steel. J. Spencer & Sons.
R—Cast steel. Steel Company of Scotland.
B 2—Forged steel shaft. Bolton

Fig. A.—Diagrams Showing the Deflection of Ten Bars 1¼ Inches Square on a Span of 6 Inches During the Bending Tests.

on the iron are adopted, than was formerly the case, and better and more reliable shafts are the result; but still something better than the best of iron shafts has been aimed at by many, and the adoption of steel shafts by most of the large com-



H C—Wrought-iron crank shaft, with grain; 72 blows.
H B—Wrought-iron crank shaft, across grain: 1 blow.
C—Wrought-iron crank shaft, across grain: 4 blows, Thames Iron Works.
L—Wrought-iron crank shaft, with grain; 4 blows, Thames Iron Works.
F—Forged steel bolts. 23 blows; Jessop.
B 1—Forged steel shaft. 16 blows; Bolton.
B 1 A—17 blows.
W P 4—Forged steel crank. 19 blows; Vickers.
W P 3—Forged steel crank. 23 blows; Vickers.
S 2—Steel plate ingot; 19 blows.
S 72—Cast crank shaft. 9 blows; Spencer.
R—Cast crank shaft. Steel Co. of Scotland.
C 2—Cast crank shaft. 19 blows; Jessop.

Fig. B.—Diagrams Illustrating the Results of Percussion Tests.

panies is the result. But there are steel shafts and steel shafts. These large shafts can only be made by a few firms who possess the necessary appliances for such heavy work, and among them various opinions as to the most suitable materials to be employed and the most suitable methods to be adopted in their manufacture are held. The success which has been obtained by the shafts made by the various firms is, in my opinion, the best test of the correctness of the ideas which have governed their construction. With the exception of the shafts already mentioned as having been made by Messrs. Spencer and Messrs. Jessop, all the steel shafts with which I have been acquainted have been made of forged steel, it being almost universally considered that mechanical work done upon steel greatly improves its ductility, and therefore increases its reliability. Sir Joseph Whitworth, however, is of opinion that if it were possible to put a great pressure upon the steel while it is in the fluid state—say a pressure of 20 tons per square inch—and to maintain that pressure during the whole process of cooling, then the ductility of the steel would attain its maximum, it not being capable of further improvement by being worked. As, however, with large masses it is impossible to obtain and maintain this pressure, he is compelled to supplement the steel—that is, steel capable of receiving a considerable temper. I have known some of the shafts made by him to crack longitudinally in the bearings when they have been overheated and incautiously cooled by running cold water over them, and, to my own knowledge, the steel of a broken shaft of his manufacture has made excellent turning tools. I am not acquainted with the present practice of Krupp's firm in regard to marine-engine shafts, as they are at present not used to any great extent in this country. Sir Joseph Whitworth, on the other hand, prefers to use a medium steel of a tensile strength of 40 tons per square inch, having a ductility enabling it to elongate 30 per cent. in a length of 2 inches. Mr. Sharp, of Bolton, I believe, favors a steel of from 30 to 35 tons per square inch; while Vickers & Sons, who are at present the largest makers of steel crank-shafts for marine purposes in the world, use only a very mild steel having a tensile strength of about 24 tons per square inch. Without wishing to draw invidious distinctions between the various firms, I believe I am correct in stating that, notwithstanding the great number of shafts made by Messrs. Vickers & Sons, only one shaft of their manufacture has broken, and that, it has been stated, was clearly due to the weakness of the vessel—a statement which cannot be made with regard to any other firm. And this to my mind is conclusive, seeing that shafts of hard steel are made of the same size as those of mild steel, that the relatively mild steel used by that firm has, by its ductility, a greater amount of endurance than harder steel, which enables it to better withstand the great and often-repeated strains brought upon all marine crank-shafts from the nature of their work.

As bearing upon the question of the hardness of the metal employed, the diagram shown is interesting. It shows the deflection of the samples of iron and steel subject to transverse loading, together with the forces required to produce these deflections. The deflections are shown by the vertical distances of the curve from the lower horizontal line, while the forces required to produce them are shown by the horizontal distances from the zero point. It will be observed that up to the limits of elasticity the deflection produced by a given force is practically the same whatever material is employed, and also that from the limit of elasticity to the deflections shown in this diagram, viz., about 5/8 inch, the various materials do not differ much among themselves except in the case of the steel marked B, which lies far from the others. This is part of a shaft which, by early fracture at sea, showed itself to be too hard for the purpose for which it was used. The tensile strength of this steel is 35 tons per square inch, with an elongation of 26 per cent. in a length of 2 inches. In the case of crank-shafts and other engine work, test-pieces have been cut for tensile and cross-bending tests either from portions which have had to be machined out, or from portions specially cast on for testing purposes, or from the gates or heads of the casting. In cases of stern-frames and rudders and other large castings, in which such tests are practicable, in addition to the tensile and cross-bending tests of pieces cut from the casting, they have been subjected to drop and percussion tests as follows: Frames are hoisted to an angle of about 45°, and allowed to fall on a hard floor. Rudders are hoisted to a hight of 10 or 12 feet, and let fall upon a flat floor. Subsequently they are hammered all over. Tiller-quadrants are also subject to percussive tests, and these tests appear to show that cast steel may be made quite as reliable, even if not more so, than wrought iron for forgings; but the forged steel surpasses in ductility anything that has been attained in castings, and, notwithstanding the opinion of M. Pourcel, I think that it will never be possible to entirely obtain from castings, by any chemical process whatsoever, such results as are obtainable by mechanical forging. With regard to the quality of steel for cast crank-shafts and other engine-work, the Committee of Lloyd's Register considered that the tensile strength should not exceed 30 tons per square inch, and that a piece cut 1¼ inches square should be capable of bending cold through an angle of 90° over a radius not greater than 1¾ inches. It is possible that steel of greater hardness than this would be sufficiently ductile for many purposes, and with greater experience it will perhaps be found advisable to modify these tests, but more experience is now required in order to give greater confidence in the material.

(To be continued.)

* A paper read before the recent meeting of the Iron and Steel Institute of Great Britain.

Gaseous Fuel in the Manufacture of Iron.

In a paper on the production and utilization of gaseous fuel in the manufacture of iron, read at the spring meeting of the British Iron and Steel Institute, Mr. W. S. Sutherland remarked that it was sometimes stated in favor of any given class of gas producers that it yielded a certain amount of hydrogen from the decomposition of steam passed over the hot carbon. If carbonic acid, instead of carbonic oxide, alone be produced with the hydrogen, there is a loss of heat which goes away as sensible heat. Hence, if in any gas producer carbonic acid be formed, there is great loss of heat, even although with the carbonic acid a due amount of hydrogen be formed as well. Now, this formation of carbonic acid is a function of temperature. The lower the temperature, continued Mr. Sutherland, at which the carbon and air, or carbon and steam, come together, the more carbonic acid is formed, whether in a Siemens or water-gas producer. And I have found that to work well with water gas (so far as treating iron is concerned), it is necessary to get up a very high degree (not less than 1200° C., I should say), which, however, can be done without injury to the apparatus, if the parts exposed to it be protected by exterior cooling. The quantity of gas above given represents only about 55 to 60 per cent. of the available heat in the fuel, but I believe that by improvements, which may be very simply made, this percentage may be very largely increased, although, since there is a double operation and combustion in making the gas, the loss of heat must evidently be greater than in making producer gas. But this loss is, except when regenerators are used, largely counterbalanced by the higher temperature which can, owing to the absence of nitrogen in the gas, be obtained by its simple combustion, and by its greater heating power per unit of bulk, which enables much smaller mains to be used to convey it, and by the fact that much smaller furnaces may in many cases be employed. A great objection has been made to the poisonous quality of this gas, but I believe that it is no more poisonous than coal gas, and from my own experience with producer gas, coal gas and water gas, I am convinced that the hydrocarbons and tarry matters do far more hurt than the carbonic oxide. In fact, it seems to me that the poisonous effects of carbon gases and vapors are somehow proportional to the weight of carbon in the injurious compound, and in that case the hydrocarbons in coal gas are quite as deadly, if not more so, as is well shown by the number of accidents that have happened with coal gas.

Compared practically with coal gas, the heating power of water gas seems one-half; but experience has shown that it may be produced at a cost not exceeding 3d. per 1000 feet, after paying for coal, labor and plant, and that the first cost of plant is not very great; while for simplicity in using it when made, it is far superior to producer gas, and more easily managed. It will perhaps be called to mind by many that numerous attempts have been made to manufacture water gas in retorts; but an examination and comparison of these proposals with the method above described shows that the intrinsic difference between them lies in the facility which this method allows of raising the steam and fuel to a temperature which would rapidly destroy the retorts, but which is necessary for the attainment of good working results. While working with Siemens gas in 1871 and 1872, I had much trouble with the tar and water which came over with the gas and stopped up the tuyeres, and which it was therefore necessary to condense and separate. Now, it will be evident from what has gone before, that in making Siemens gas, the higher the temperature at the bottom of the producer the better the gas made, and the less carbonic acid there will be in it.

Many people are in the habit of saying that if coal be made into this gas there is a loss of sensible heat amounting to about 30 per cent., and they give as a reason the fact that carbon burnt to carbonic oxide really does generate about that quantity of its available heat, which, if the gases be cooled down, would be certainly lost. But they forget the coal tar and water, which must be distilled off from the fuel, and to do which requires at least 10 per cent. of this heat, leaving only 20 per cent. to account for. Now, this 20 per cent. is very difficult to utilize, and the only satisfactory way that it can be practically carried out is to take the heat down to the bottom of the producer again and make it superheat steam, so as to form some water gas. This I did at that time by cooling down the hot gas by the air going to the producer, so that at the same time the tar and water were condensed. But there is a simpler way of doing it. It is well known that increasing the draft of a fire increases its temperature. Then, if the draft in the producer be increased, while increasing the heat at the bottom we shall diminish the carbonic acid in the gas, and at the same time enable more steam to be passed into the producer without increasing the carbonic acid. Now, it must be evident that, by the law of conservation of energy, if this heat at the lower part be increased through the quickened draft, it must be at the expense of the heat in the outgoing gas, or else we should have a means of increasing the quantity of heat produced by merely putting a fan on. Therefore, by this simple means alone the heat of the outgoing gas may be utilized, and, practically, we find that while the carbonic acid may be kept down to from 0.2 to 2.5 per cent., the temperature of the outgoing gas often does not reach 300° C., which represents a loss of only about 7.5 per cent. of the total available heat of the fuel. There are two ways of accounting for this result. In the first place, it was pointed out by Mr. Lowthian Bell that the descending column of fuel carried down with it about 5 per cent. of the heat produced, and, in the second place, the hotter the fuel, the more the air going to supply combustion will be heated by conduction from the glowing fuel just before coming into actual contact with it.

Thus the reactions go on and heat accumulates, but always at the expense of the upper portion of the fuel and of the outgoing gases. But, to work at this higher speed, the producer must be perfectly accessible, so that it may be easily cleaned; there must be as little tendency to scaffold as possible, and, above all, it should not be greater in size than would allow of a man easily breaking up the fuel in it if it caked over or broke through; or, if it be large, mechanical stirring should be resorted to. The problem is to keep the fuel like a sponge, but without large holes and cavities. With the temperature thus kept down, and the loss by cooling made a minimum, little water is needed to bring it down to the requisite point for condensing effectively the tar and water, and, as the higher the velocity or draft the less is the plant required to treat any given weight of coal, so the outlay per ton of fuel gasified and purified is reduced. In a plant recently erected the gas taken away from the producer has its pitch first thrown down to prevent the passages choking up, and is then passed through a condenser, which, while cooling the gas effectively, can increase the temperature of the water for cooling so as to adapt it to steam raising. It is then scrubbed to extract the ammonia, cyanides, &c., and, if drawn from the producer, passes through an exhauster. At the high speed kept up, much of the tar is carried on in waves along the interior surfaces of the mains, and if this were stopped in the ordinary way, the fuel absorbed in the horse-power would be enormous; but observing these waves, I thought that if the surfaces of part of the mains were developed and made porous, and contained in an outer chamber, in which a lower pressure could be kept up than that in the mains, these waves would ooze through the porous surface and get out of the way of the current, while the difference of pressure would prevent them from getting in the way again. Experience has proved this idea to be correct. The surfaces are now made of wire gauze tubes through which the gas passes, a sufficient number being purposely set up in an outer chamber, from which some of the gas is passed to the other side of the blower.

This system is perfectly smokeless, and has the advantage of taking sulphurous and sulphuric acids very thoroughly out of the gas as well, thus removing a very great evil from the atmosphere. In the first part of my paper it is pointed out that to insure sound welding the gas should be supplied with the requisite air in constant and definite proportions. To secure this it has been found necessary to mix the gas and air thoroughly together before combustion, care being taken to prevent explosions, and dissipate them if they should happen. A very powerful and concentrated flame is thus secured, which, when it contains an excess of gas, has no tendency to oxidize the iron, and gives a very soft, mellow heat. I do not believe that mixed gas and air have ever been worked in this way before—at any rate, not on the large scale that we work on—and, as must generally be the case in new combinations or methods, the study of its action must be instructive. Explosions of the mixed gas and air are prevented by very simple means, and the method has now been at work for some 10 years without accident. I should like, in this connection, to mention that when an explosion occurs in any ordinary working mixture, it does not instantaneously travel along the mains, but is carried forward in the form of a wave or disk of flame, traveling with a certain velocity. This disk seems to have some dynamic properties which liken it to a solid mass in motion. Thus, it will not turn a corner readily unless obliged to do so, and strikes anything it comes against with great force. If, then, at a convenient corner of the mains an outlet be provided in the direction of the delivering main, and a light cover of india-rubber be fastened on, the disk of fire will cut it out or break it, just as a blow would do, and no further damage is done. Indeed, I have often watched this disk of fire moving backward and forward in a passage, and obeying the hand that was closing and opening the gas and air valve. The ordinary Bunsen burner, in which the gas and air mix as they come together for combustion, is always supposed to produce a higher temperature; and since by the above system a far more perfect mixture and diffusion can be obtained, it naturally occurred to me that this offered an easy solution of the problem of obtaining high temperatures. And so it does, but coupled, I must confess, with some drawbacks. I have spent much time and trouble over it, and argued in this way: If it be possible to keep down the carbonic acid in producer gas, while at the same time storing up in it nearly the whole of the 30 per cent. of heat before mentioned, and if by mixing the gas with the proper amount of air before burning a rapid combustion be effected, why could not this simple means be employed to burn fuel generally? And if it be true that mixing the gas and air raises the temperature, this increase could only be at the expense of the outgoing gases; therefore a kind of regenerative action should be set up that would cause an accumulation of heat at the root of the flame, and which would extend itself as the action went on.

Now, I must say, and can show in practice, that all this is true; but so far its application seems to be limited to special uses, of which steam-raising is one of the chief. Consider that by this means the full effect of the fuel can be produced directly it enters the boiler, so that complete combustion is secured at once, and the gases have only to give up their heat in passing along the boiler, that the highest temperature is produced at the very first, and that there is therefore a greater fall and consequent better duty, and you will then say that there is reason in what I say. But in these general uses where Dr. Siemens has introduced his magnificent system of regenerators, experience has so far shown that his system is better, and for the following reasons: Suppose a stream of mixed gas and air to enter a furnace. There is no trouble about diffusion, since the gas and air are already thoroughly mixed, and therefore they ought at once to burn and give out their highest temperature; and since the rate at which the gases will conduct depends upon the temperature of the heating body (the initial heat of the gases being supposed constant), and as well upon the thickness of the stream of gas, it follows that if this higher temperature be produced quickly, and the stream of gas be kept thin as it enters the furnace, more heat should flow back into the hinder layers of the gas while those in front burn, and that thus the reaction would tend to accumulate heat at the root of the flame in precisely the same way as in a coal fire, so that the faster the gases are driven into the furnace the greater the temperature would become. Now, all this really happens; but in a coal fire the fuel is traveling back, carrying heat with it, which is not the case in the gas fire, and this has to be allowed for. Besides this, the rule of conduction in the gases must be within certain limits of proportion to the speed with which the frame travels back, so that to get the highest temperatures with good producer gas, the flame must be made to envelop to some extent the stream of incoming gases, in order to make it as hot as possible all around, and this stream must also be made very thin. All this is exceedingly difficult to manage. Sometimes all goes well, a great wave of heat can be seen accumulated round the tuyere, and the furnace is hot directly; but the next minute, without any change in the quality of the gas mixture, the wave of heat is blown away from the tuyere, and in a moment or two the furnace goes down. Still, this system can be used in many ways where regeneration is not applicable, as in steam raising and in chemical works, and wherever a very high temperature is not desirable, although, for economical reasons, it is better in most cases to get the highest temperature attainable. It is not easy to understand how the rise of temperature tends to extend over the remoter parts of the furnace; but heat always tends to flow from the hotter to the colder parts, as is well known, and the heat in a furnace may be compared to a mound or wave of water on a stream driven over an eminence which remains stationary while the water goes on. The higher temperature gradually spreads more or less in the furnace, without at all breaking the law of conservation of energy, the increase of heat being always obtained at the cost of the waste gases.

Ten years' experience with thoroughly mixed gases have tended to confirm the timid views advanced some years ago. These observations refer to the action of the different gases and mixtures of gases and air upon iron and steel in welding and heating, and in puddling iron as well, in which direction some experience has been gained with them.

In a paper read before the Royal Society, Professor Graham showed that iron at an elevated temperature is permeable by both hydrogen and carbonic oxide, and especially so by the latter gas, and he added that in the process of manufacture soft or colloidal iron absorbed or occluded within it a considerable volume of carbonic oxide, "which it carried about ever after." Now, in treating iron or steel, the only general fuels we have are carbon and hydrogen and compounds of them, which are all burnt with oxygen. The iron is practically always oxidized when in the ore, but after treatment in the blast furnace it contains more or less carbon; and leaving out silicon, sulphur, phosphorus and other impurities, the metal varies almost indefinitely between pig iron and ore, becoming white iron, cinder iron, cast iron, steel, soft steel, wrought iron pure iron, and burnt iron containing oxygen. Therefore, if there be no impurities in the iron beyond hydrogen, oxygen and carbon, all these different qualities would be owing to some difference in the relative quantities of these substances in the iron, to the manner in which they are combined or mixed, and to the different states in which they and the iron may be. In treating iron for welding by the aid of mixed gases and air, it is found that the first essential is that there be an excess of gas in the mixture. The slightest excess of air of fully combined carbonic acid or steam infallibly burns the iron, makes it rotten and the weld becomes a bad one. If pure hydrogen in excess be used, it is difficult to weld with it. A higher temperature is required, the iron appears to remain hard up to the melting point, holes are easily eaten into it, and when broken the iron will be found to have a fine white crystalline fracture. The weld is strong, but very short, as in steel. If carbon be the fuel used, the weld varies from a coarse, steely fracture, to a ductile one, and sometimes a rotten one, according as the carbon or air is in excess. If carbonic oxide in excess be used, the iron begins to soften at a lower temperature, becomes pasty, and seems to effervesce; when welded it is very tough, and breaks with a tough, dark, silky fracture characteristic of wrought iron. If soft steel be welded, it will not bear the same degree of heat that wrought iron will, but tends to fall to pieces on the hearth; when welded with a good carbonic oxide flame, however, it works very well, and stands a good elongation before breaking.

From observation of these facts, I always endeavor to get as much carbonic oxide as possible in my gas, and as little hydrogen and oxygen as I can, consistently with obtaining the requisite temperature. Pure iron

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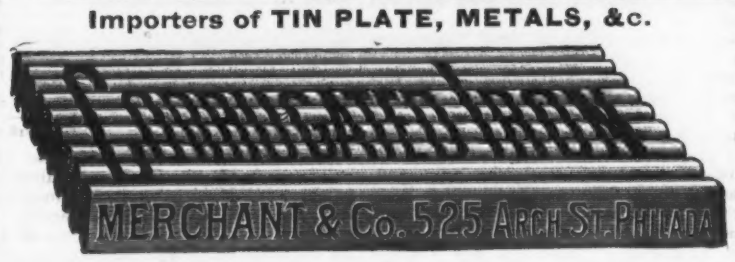

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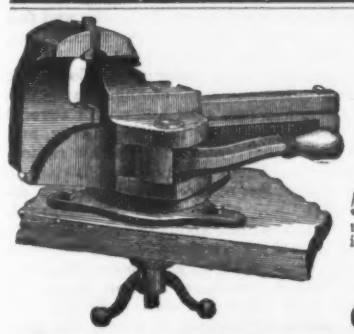

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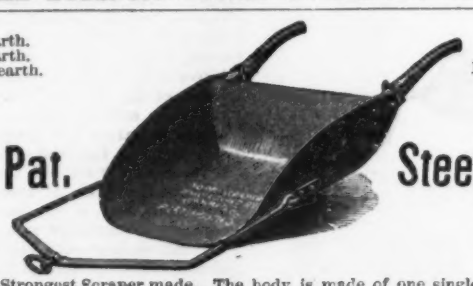

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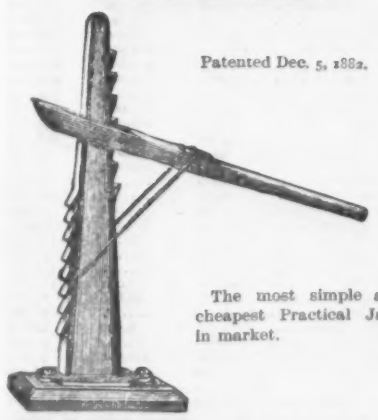

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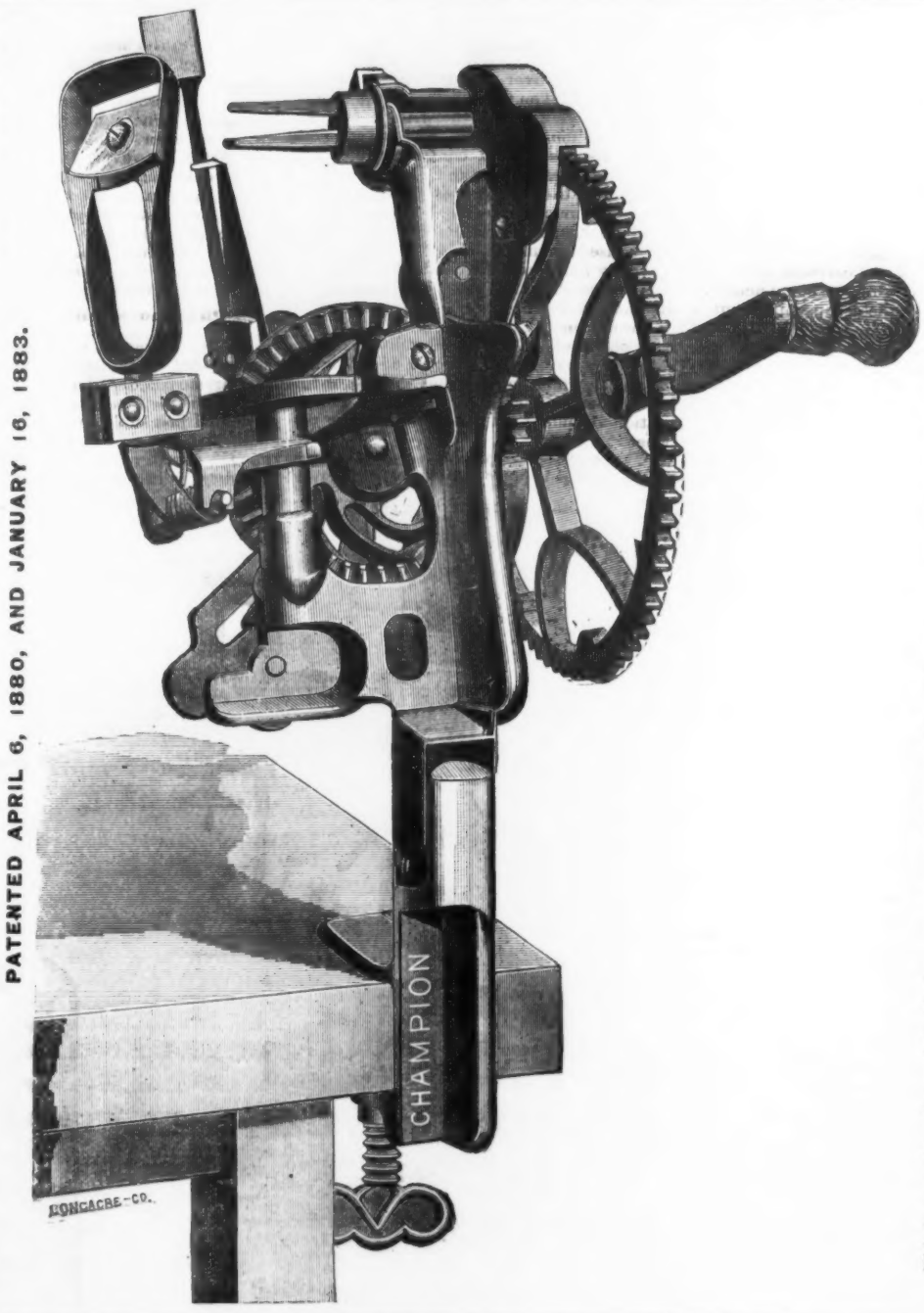

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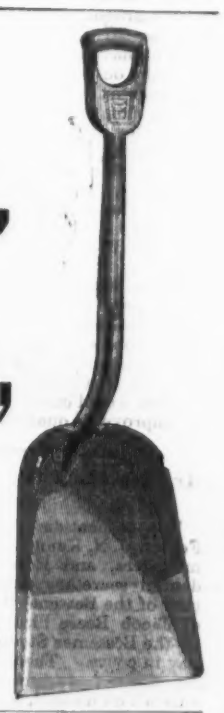

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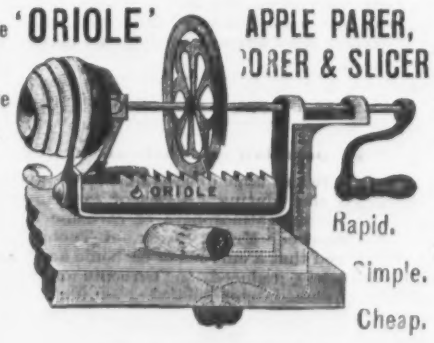

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can only be regarded as a chemical curiosity, which may for a moment be produced in practice, but which passes at once to wrought iron or oxidized iron Now, in making steel in the Bessemer converter, the metal is heated with air until all the carbon is blown out, and if the process could be stopped at exactly the right place, just when the carbon had all become carbonic oxide and remained in the metal, undoubtedly a soft, ductile metal just like wrought iron might be produced without having to add any spiegel. But so long as any unoxidized carbon remains in the iron, I say from experience it would work "raw," as the welder says, when welded, and would be crystalline, and if iron oxide remained in it, it would be rotten. Now, why should we not recognize Professor Graham's definition, and say that while steel is iron containing unoxidized carbon, wrought iron is iron in which carbonic oxide is occluded, taking the intermediate place between carbon in steel and oxygen in burnt iron? Carbon and carbonic oxide are both soluble in iron, while carbonic acid and oxygen are both practically insoluble, but a low oxide of iron is again soluble. It seems reasonable to imagine that carbonic oxide, which must be fluid in the metal, acts the part of a solvent in allowing a proper coming together of the particles, while carbonic acid and oxygen tend to keep them apart, and iron oxide, while somewhat soluble, acts the part of carbon in pig iron in an exaggerated degree, in that it causes the metal to become softer, and even rotten, when cold. A curve might be drawn showing the transition from one state to another, in which the admission of carbonic oxide would lengthen out the point representing pure iron. Now, the conclusion I wish to draw from all this—if you decide that it is just—is an important one.

To produce a good, true wrought iron which will weld well, and in all particulars take the place of the best puddled iron, use the Bessemer converter or an equivalent vessel, and instead of blowing raw air into it, blow Siemens gas (which contains an excess of carbonic oxide) along with the air, in varying proportions, until at the finish a proper excess of gas is present. To keep the metal fluid with this proper excess, let gas or air, or both, be heated to a sufficiently high temperature before going in, and pass them, in thin streams side by side, under the surface of the metal—that is, through the bottom, sides or wherever they can be got to go—so that when they come in contact with the metal the mixture may be perfect, and good wrought iron will be produced. Now, it may be objected that the present action in the converter produces carbonic oxide. True, and I believe that if it were possible to blow out all the carbon and stop just at the right moment, wrought iron would be produced; but in reality the metal would be overblown at one part, while another would contain some carbon, a third carbonic oxide, and so on. If, however, carbonic oxide in excess were blown in with the air, the sum of the actions would, as it were, steady the process all through, and lengthen out the carbonic oxide or wrought-iron period, so that the whole could be brought to the proper quality without fear of being overblown. Again, it may be said that analysis shows that carbonic oxide does exist in overblown Bessemer steel, but always with nitrogen, hydrogen and oxide of iron, because Mr. Lowthian Bell and Dr. Aldin Wright have shown that carbonic oxide will not take out the last portion of oxygen from the iron oxide (produced by the overblow), which thus keeps the metal rotten; and besides, the carbonic oxide is not sufficient to do what is expected from it. It is always not any one action which takes place, but the sum or resultant of a great many; and to get the carbonic oxide to do its work properly, it must as much as possible be in excess. The object of this process would be simply to produce wrought iron, with all its good qualities increased; and although I perhaps ought not to say so here, certain dynamic considerations make it probable that this process would greatly facilitate the elimination of sulphur and phosphorus, while it is but reasonable to expect that its introduction would cheapen wrought iron as well as improve its quality.

Mr. Reese and the Bessemer Steel Co.

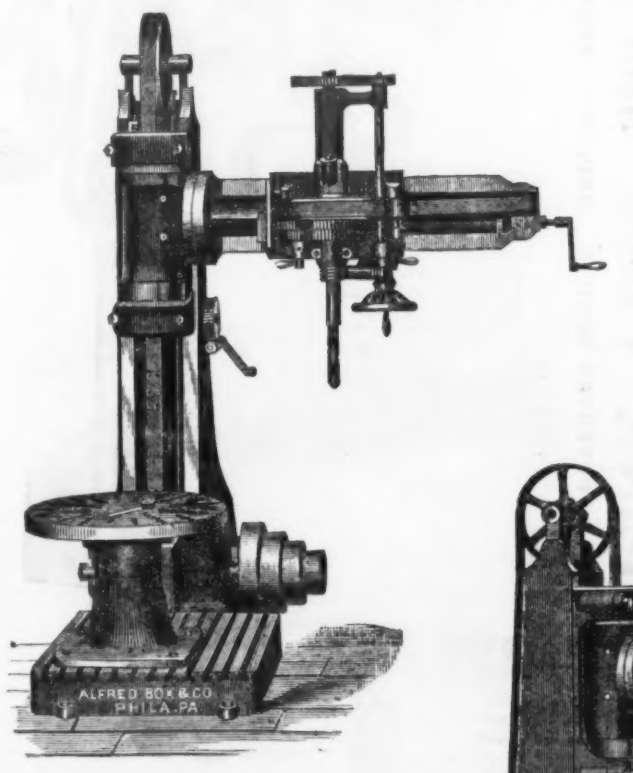
The replication of Josiah Wharton, S. N. Fenton, J. N. Kennedy and Andrew Carnegie, managers, and Robert F. Kennedy, confidential secretary and secretary and treasurer of the Bessemer Steel Co., to the answer of Jacob Reese filed to the suit against him by the Bessemer Steel Co., was made yesterday in court. The suit was entered to compel Reese to turn over certain valuable patents which he held, and inventions which he made, to the Bessemer Steel Co., under an alleged agreement made between the parties, by which it appeared that Reese, for a consideration, agreed to convey all his patents and the inventions for the manufacture of iron and steel, and any patents that he might obtain, or inventions that he might make, to the said company. The company complained that Reese had not acted in good faith, and had failed to comply with the terms of the agreement, principally with respect to his invention known as the "basic process" for steel, and was withholding valuable information in regard thereto.

Reese's answer to the bill set forth that he had been fraudulently and by deceit induced to make such an agreement with the Bessemer Steel Co.; that he was to have received $5000 a year for the use of his inventions, and any that he might make, and that not only was he deceitfully induced to make the agreement, but he had never received any of the alleged consideration of $5000 a year. The replication contains the affidavits of the plaintiffs named above, and Mr. Carnegie's is given as a sample of all. He denies fraud and deceit on the part of the Bessemer Steel Co. in making the agreement, and denies that Reese was induced against his will or by misrepresentation to effect the arrangement, or was forced into accepting the agreement by threats, as alleged. It is also averred that Reese came to Carnegie and begged him to have the company enter into such an agreement. The negotiations ered several weeks, during which time ntinually advocated the desirability of effecting the agreement, and seemed very anxious to have it accepted. It was finally accepted by the company through the efforts of Mr. Carnegie, and any allegations to the contrary of what has been set forth in the affidavits are branded as false.

A New Radial Drill.

Messrs. Alfred Box & Co., of No. 312 to 316 Greene street, Philadelphia, are offering a new radial drill which embodies important improvements over the drill formerly built by this firm. The two engravings presented herewith give views of the drill in two different positions, and from them an adequate idea of its design and construction can be obtained. Messrs. Box & Co. always found a belt for the purpose of transmission of power so much superior in every way to bevel gear and long splined shafts, sometimes used in machines of this character, that they have embodied it in the new machine here shown. From the tests of the machine at work, very satisfactory results in power, smooth running and strength have been obtained. The manufacturers also direct attention to the additional advantage of durability which follows construction of this kind, from the fact that all clatter and vibration attendant upon bevel gears are dispensed with.

The construction of the machine is very simple and is briefly described as follows:



New Radial Drill.—Fig. 1.—Front View.

The column is built on a taper box style, bolted to T-slotted bed by internal bolts. It carries in a vertical dovetailed slide a double journal carriage, which is held by taper gibs and operated by rack and worm gear, thus preventing it dropping or raising while at work. With this gear the part can be raised or lowered easily by hand. When desired, however, a power attachment is furnished. This carriage carries the swinging head in two large journals, one being furnished with tightening bolt to hold the arm rigid. The arm is bolted to this head by four bolts in a circular T-slot, thus permitting it to swivel anywhere from vertical to inverted. For the purpose of setting, it is graduated by gears. The drill spindle is fitted with substantial back gears, and is forced down by an ingenious telescoping thrust bearing. This feature of the tool is patented, and is of sufficient interest, possibly, to merit more particular attention at some future time. The square box at the foot of the column contains the driving pulley on a shaft journaled on each side, and carrying on its outer end the cone pulley. The internal pulley is in line with center of swinging head, which permits the arm to swing, merely causing the belt to twist. It in no way throws it out of line, thus giving the radial motion. The belt passes out through the arm and back over idlers over the top pulley, and then down again, and forms a simple but very complete circuit, giving all the motions desirable. The top pulley of the column has a vertical slide, and can be screwed up to tighten the belt, which is a great convenience, admitting of the belt being cemented and riveted, and avoiding the annoyance of lace holes and the necessity of cutting the belt. Messrs. Box & Co. are manufacturing these machines in various sizes adapted to different classes of work.

Fig. 2.—Side View.

SCIENTIFIC AND TECHNICAL.

Preparation of Carbonic Oxide.

In a recent issue of *Engineering* we find it stated that during a series of experiments for which an atmosphere of carbonic oxide was required, Mr. E. Roack, of Tuebingen, observed that a current of carbonic acid was completely reduced to carbonic oxide by being passed over heated zinc dust. The observation is not new, since smaller quantities of carbonic oxide have occasionally been prepared by this method. But it is hardly known outside the laboratory, and Mr. Noack at any rate deserves the credit of having drawn attention to the great facility and completeness with which this process can be effected. It is only necessary to let the carbonic acid pass over zinc dust deposited in a tube so as to leave a clear channel above it; the tube is heated, but need not glow, as the reduction takes place at relatively low temperatures. The gas thus obtained is mainly carbonic oxide, for which a larger field of application may be found when this easy and reliable means of its manufacture becomes more generally known.

The Relations of Color and Sound.

An optical demonstration of the effect of sound on the colors and figures in soap bubbles was recently given at the Franklin Institute by Professor Holman. A film of soap was placed across the end of a phoneidoscope. To bring the sound in direct contact with the soap a tube was used. A reflection of the film was thrown on a canvas screen, where it first assumed a bluish-gray appearance. An intonation of the voice with the lips close to the mouth of the tube caused a number of black spots to appear on the reflection. When these passed away a beautiful light green, intermingled with pink, remained. These two appeared to be the principal colors caused by sound. It was noticeable, however, that, while a certain tone would cause the same figure to reappear, it had no control over the color. A tone which, for instance, caused one solid color to appear would bring out, perhaps, a dark blue at one time and a yellow at another. No difference was noticeable in the effect of the male and female voices.

Phosphorescence of Sulphur.

Mr. K. Heumann, of Zurich, recently observed that a very brilliant phosphorescence, by far surpassing that of phosphorus, can be obtained with sulphur, when the sulphur is heated just sufficiently to slowly combine with the oxygen of the air, but not high enough to enter into this combination with rapidity, as in the case of ordinary combustion. The phenomenon is most simply shown by heating a glass rod and dipping it into flowers of sulphur; the well-known blue flame, which will appear if the rod should have been made too hot, having been blown out, a peculiar gray white light begins to play round the rod, altogether different from the blue sulphur flame. Very beautiful rays of more than 4 inches in length of this unsteady light can be produced by quickly heating sulphur up to 180° C. (356° F.) in an air bath. The analysis shows that the product of this slow combustion is mainly sulphurous acid in very small quantities, as in the case of ordinary combustion, although another compound with less oxygen may also be formed. One would expect that this phenomenon, which may also be shown with some sulphur compounds, would have been noticed in furnaces; Mr. Heumann asserts, however, that he has not been able to find any mention of it.

The Body Fire-Damp Detector.

A new fire-damp detector, invented by M. G. Body, of Locornette, in the Belgian Ardennes, has lately been tested at the Cockerill mines and works, Seraing. It consists of a portable miners' lamp protected by wire gauze, like the Davy, and placed in communication by a wire, with an electric bell, but electric contact is prevented by a catch, held back by a wick, which is impregnated with several chemical substances. This wick is capable of combining with the fire-damp and igniting spontaneously as soon as the gas attains a dangerous proportion. In such a case, the wick, in becoming consumed, releases the catch, electric contact is formed and the bell rings. The lamps placed at certain intervals apart serve for illumination, and directly the gas issues from any point it acts upon the nearest lamp, which thus gives warning of its presence. The direction of the outburst is also indicated by the order in which the bells, put in connection with several lamps, are caused to ring. One of these new detectors was at the Cockerill works placed in receptacles prepared so as to represent the same conditions as the working-place of a colliery. When the quantity of fire-damp, determined by the composition of the chemical wick, was introduced, the bell did not ring until the exact quantity of gas was present, while the near approach of a flame is said to have produced not the slightest effect.

The Steel Wire Rod Industry.

In a recent editorial on the steel wire rod industry of the United States, the *Bulletin* of the American Iron and Steel Association says:

There are nine establishments in this country which are now prepared to make steel wire rods, and an additional one is being built. There are also steel wire rod mills projected near Chicago and near St. Louis. The existing steel wire rod manufacturers are as follows: Washburn & Moen Mfg. Co., Worcester, Mass.; Albany and Rensselaer Iron and Steel Co., Troy, N. Y.; John A. Roebling's Sons Co. and Trenton Iron Co., Trenton, N. J.; Cambria Iron Co. and Gautier Steel Department, Johnstown, Pa.; Cleveland Rolling Mill Co., Cleveland, Ohio; Union Iron and Steel Co., Chicago, Ill., and Harrison Wire Co., St. Louis, Mo. Of these companies the only ones not now making steel wire rods are the Union Iron and Steel Co. and the Harrison Wire Co. The Hartman Steel Co. is the name of the corporation which is building a steel wire rod mill, and it is to be located at Beaver Falls, Pa. Some of the companies named above have more than one rod mill. The total number of steel wire rod mills now in existence in the country is 13, of which nine are in operation, but only six are running on full time. The total annual capacity of all the mills referred to, excluding the one being built by the Hartman Steel Co., is 170,000 gross tons of steel wire rods. The mills now in operation, however, are only rolling rods at the rate of 90,000 gross tons a year.

The above information has been obtained by us from the various companies, and can be relied upon as correct. It shows that even at the present low rate of duty there are special circumstances under which some American steel wire rod mills will be operated. They were built, however, when prices were so high on both sides of the Atlantic that there was some profit in the business. Now they are run spasmodically, whenever they can get an order which will just cover cost, or when a special quality is required for which it will not be prudent to rely upon the guarantee of a manufacturer thousands of miles away, or when a wire mill finds it best to make its own rods, and thus secure uniformity or unusual lengths or better quality, notwithstanding the cost is somewhat higher than the price of foreign rods. It is safe to assume that if the duty were high enough to be protective nearly all of these mills would be running on full time and turning out their maximum product. It is true that one steel wire rod mill is now being built in spite of the formidable foreign competition to which it will be subjected in consequence of the refusal of Congress to increase the duty on foreign steel wire rods, and it is stated that several others are contemplated, but it remains to be seen whether they will all be completed, and if so, whether they can be operated steadily after they are built. One thing, however, is clearly manifest, and that is that this country has the capacity to manufacture the steel wire rods that it uses, as the completed mills can turn out 170,000 gross tons per annum, and the Hartman Steel Co. will soon be in a condition to add 30,000 tons more. If the demand exceeds 200,000 tons yearly, which is problematical, and the duty were properly adjusted, enough other mills could be equipped in a very short time to fully keep pace with that demand. Congress may some day realize the importance of encouraging this industry.

New York's Great Growth.

The material prosperity of New York is shown to a great degree in the increased building which is perceptible all over the island, especially in the upper end. In business marts mammoth structures are being reared, while the Cotton and Produce Exchanges are providing for buildings which cannot be equaled in the world of trade. During the first six months of the present year the amount expended in new buildings exceeds the same period last year by $3,883,495. The official report of the Building Department for the quarter ending June 30 is as follows:

Class of buildings.	Nos.	Cost.
First-class dwellings	116	$3,939,000
Second-class dwellings	12	97,400
French and English flats	98	6,454,000
Hotels	4	378,000
Tenements and stores	79	1,482,000
First-class stores	20	1,767,000
Second-class stores	13	80,300
Third-class stores	21	114,355
Tenements	132	2,057,500
Offices	10	337,900
Churches	2	80,000
Factories	12	386,000
Schools and colleges	2	284,000
Public buildings	8	588,000
Stables	25	168,325
Workshops	7	43,500
Frame buildings	56	262,690
Total	1,148	$18,508,970

This is an increase over last year of 517 buildings, and an enhanced valuation of $5,225,170. For the first six months the total number of buildings erected, or in course of erection, numbers 1779, at a cost for construction of $31,782,800.

The Comstock Lode.

The San Francisco *Bulletin* gives the following interesting history of the rise and fall of the Comstock Lode mining speculation, which will be found interesting:

The nominal money value of the Comstock Lode has undergone many changes in the last twenty years. From 1861 and on for several years the mines grew in public favor, and values rose rapidly, and with but few radical contractions. From 1868 prices began to fall off under loss of ore deposits and a diminished bullion yield. This reduction followed the mines until about the close of 1870. At that time the 25 or more leading mines on the Lode were rated at a trifle over $4,000,000 in round numbers. Then came the Belcher and Crown Point bonanza, and values again expanded all along the line. This continued for a couple of years, with now and then an interruption. Before the waning influence of an exhausted ore body in these two mines had become to be seriously felt, the edge of the bonanza in the Consolidated Virginia and California mines was uncovered. This was followed by an unparalleled inflation in values until 1875, when the properties that were thought to be dear five years previously at $4,000,000, were considered (by some at least) undervalued at $275,000,000.

That was the highest valuation ever put upon the Comstock Lode. The same mines from that time forward began to decline in value, long before there was any sign of exhaustion of the ore body that had led to the inflation. Of course, the level of values was much lower when this information got out. The passing of the first dividend by the Consolidated Virgina settled the business with some, and unloading was the order all along. A few held on, under the belief it was only a dodge of the enemy. The factor of distrust kept the market from going to pieces for some time after the majority had given up all hope of a renewal of dividends. There is occasionally an old stockholder who still believes that both of these mines could pay dividends now, if the leading owners would consent to uncover alleged reserves. The several assessments since levied have not changed the opinions of these persons. Their faith is certainly a pleasant diversion, if not too costly. From $4,000,000 to $275,000,000 was a big jump, and from $275,000,000 to about $3,000,000 was an equally big fall. But these are feats which have been accomplished by the Comstock Lode inside of twelve years.

We do not remember the lowest valuation for the Comstock Lode in the past three or four years. But the valuation of a year ago was quite small. According to a table compiled by us on the 1st July, 1882, the 29 leading mines on the Comstock were valued at $3,061,910. These mines are divided into 4,021,560 shares, so that they were selling a year ago for less than an average of 75 cents per share. The leading stock at that time was Union Consolidated, which was selling at $8.62½ per share. Sierra Nevada was then selling at $4.75, Mexican at $4.50, Best & Belcher at $3.25 and Ophir at $2.15. Thus these five mines were selling for a nominal value of $2,336,420, or 76 per cent. of the total for the whole 29. The only two mines selling at $1 per share were the Gould & Curry at $1.25 and the Utah at $1.05. There were eight mines in the list whose stock was rated at only 5 cents per share, and the rating would likely have been still lower but for the indisposition of the Stock Board to split a five-cent piece. There was a great change in these values last month, prices of some of which culminated about the 1st of June. At that time Hale & Norcross was the leading stock, selling at $8.50, against $8.62½ for Union Consolidated a year ago. Following is a statement of the valuations of 29 Comstock mines on the 1st of June in 1882 and 1883, with the assessments delinquent between the two dates:

	June 1, 1882.	Year's assessments.	June 1, 1883.
Utah	$21,000	$120,000	$61,000
Sierra Nevada	475,000	400,000	675,000
Union Con	862,500	200,000	775,000
Mexican	453,600	352,800	564,000
Ophir	216,720	201,600	389,080
California	54,000	378,000	216,000
Con. Virginia	162,000	162,000	432,000
Best & Belcher	327,600	100,800	589,400
Gould & Curry	135,000	162,000	421,200
Savage	33,600	252,000	341,600
Hale & Norcross	33,600	168,000	958,000
Chollar	22,400	168,000	453,600
Potosi	44,800	84,000	201,600
Julia Con	5,500	11,000	22,000
Bullion	5,000	100,000	125,000
Exchequer	10,000	.....	45,000
Alpha Con	7,500	.....	75,000
Con. Imperial	25,000	25,000	25,000
Confidence	12,400	6,240	87,360
Yellow Jacket	65,000	.....	582,000
Kentuck	6,000	.....	75,000
Crown Point	20,000	.....	185,000
Belcher	26,000	52,000	161,200
Overman	5,760	28,800	69,120
Caledonia	5,000	.....	20,000
Silver Hill	5,400	5,400	10,800
Justice	5,250	52,500	31,500
Alta	10,800	108,000	75,600
Benton Con	5,400	32,400	16,200
Totals	$3,061,910	$3,760,540	$7,587,260

As will be seen, the nominal value of these securities has more than doubled within the past twelve months. But much of this increased value is supposed to represent new money that has been put in during the interval in the form of assessments. The nom-

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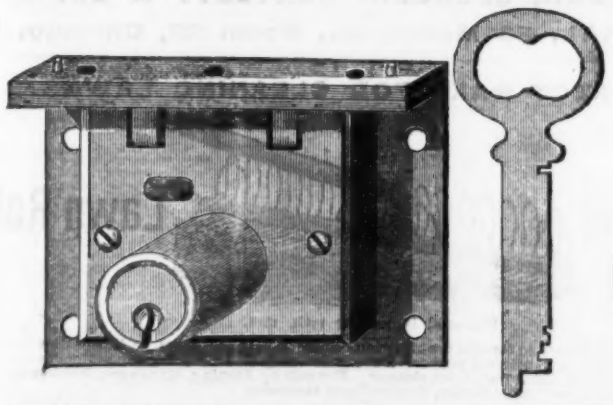

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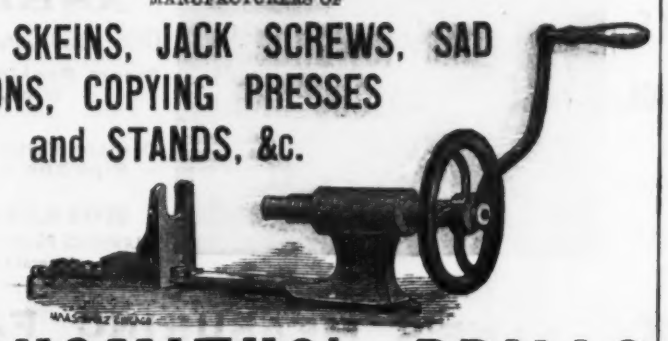

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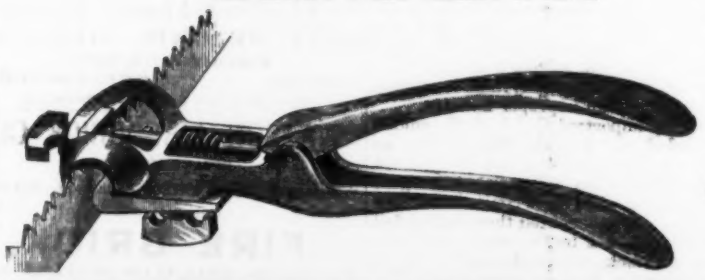

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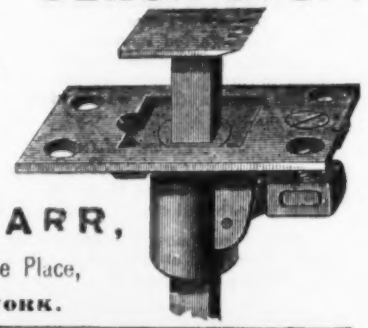

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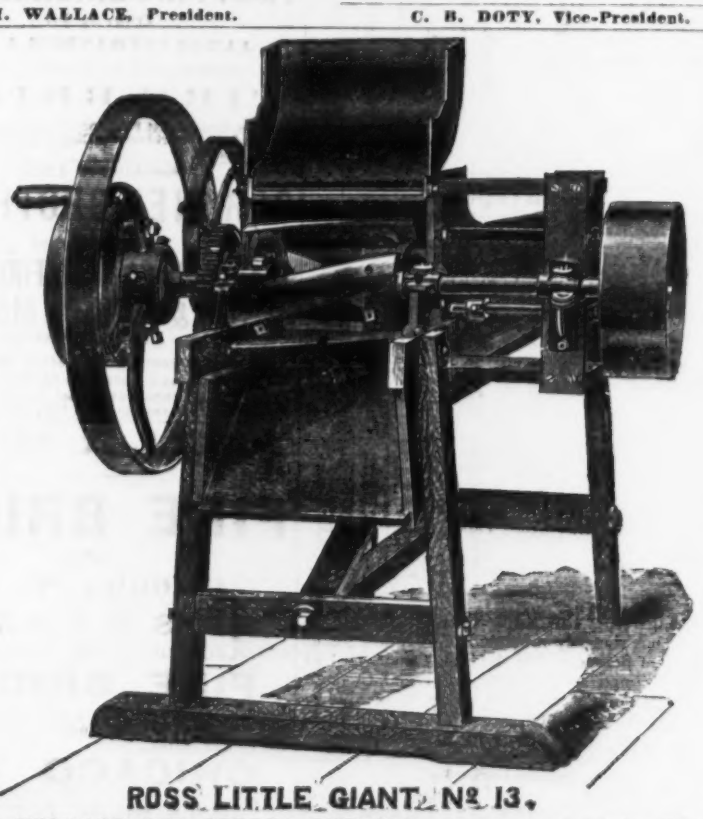

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GEO. M. EDDY & CO.,
Manufacturers of
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Of Cotton, Linen & Steel
ALL PURPOSES.
351 to 353 Classon Ave. Brooklyn N. Y.

inal value on the 1st of June, 1882, with the assessments delinquent during the year, compare as follows with the nominal value at the close of that year:

Value June 1, 1883	$7,587,260
Value June 1, 1882	$3,061,910
Assessments, delinquent	3,160,540—$6,222,450
Increase for the year	$1,364,810

INDUSTRIAL ITEMS.

NEW YORK.

The Chalmers-Spence Co., manufacturers of patent air-space coverings for boilers, Toope patent asbetos-lined removable pipe coverings, and the National steel-tube cleaner, for cleaning boiler tubes, have removed to their new factory building, 419 and 421 Eighth street, East River.

MASSACHUSETTS.

The large building in Bridgewater formerly occupied by the Southern Cotton Gin Co. has been taken by Shaw & Lambert, lathe builders, who were formerly at Brockton. Their screw-cutting engine lathe has been on the market but 12 months, and in that time 42 have been shipped to various parts of the country. Shaw & Lambert have purchased the patents of the Hawes upright drill, and will build them in future.

The Hopedale Machine Co. recently shipped a carload of cotton machinery to Mexico. The company have recently secured the patent on an ingenious automatic screw machine, which has a capacity of turning out nearly 2000 perfect screws a day.

About one-half of the new copper works stock at Taunton has been subscribed for.

Bridgewater is to have a tack company which will not enter the syndicate. It is to be called the Bridgewater Tack Co., and will start work shortly with 18 machines.

The Cape Cod Glass Works, at Sandwich, which for many years have been lying idle, have been started by a company who have a specialty in the glass business. It is a new kind of fancy ware. The factory has been put in order, and fire was lighted in the furnace on June 28.

RHODE ISLAND.

The Campbell Machine Co., at Pawtucket, have voted to at once begin the building of their wax-thread sewing machines.

A stock company with $100,000 capital has been organized at Woonsocket, to manufacthe Miller printing press.

CONNECTICUT.

The proprietors of the Wallingford Glass Works, recently burned, talk of locating at Hartford and organizing a joint-stock company. The capital of $60,000 needed by the company is assured by citizens of Hartford. The concern will employ 150 to 175 men.

The Meriden Flint Glass Co.'s works, Meriden, shut down on June 30. Their furnace, after seven years' steady running, needs repairs.

OHIO.

Joseph Corns, after a prosperous three years as lessee of the Massillon Rolling Mill, concluded arrangements yesterday by which he and his son became owners of the mill, under the firm name of Corns & Son. It is the intention to enlarge the works considerably, increasing also the working force, which now consists of 150 men. The mill has been running uninterruptedly during all the recent period of depression and uncertainty in the iron trade, and has the most flattering prospects. The Youngstown correspondence of the Cleveland *Leader* tells of another enterprise in which Mr. Corns has recently been making negotiations, namely, the lease for five years of the Hall Iron Works, at Hubbard. "Mr. Corns," says the item, "has had several recent interviews with Jesse Hall, the owner of the plant, and has made a proposition to lease it for five years. The mill has been idle for some time, and if Mr. Corns secures it he will have it all in operation within 30 days."

Summers Bros. & Co., of Struthers, are making about 50 tons of finished sheet iron per week, which is used extensively for dripping-pans, stove-pipe elbows and in mower and reaper works. They are also making a specialty of shingle bands. They are just now putting up a new furnace for making roofing iron, and are also placing three large boilers. The pay-roll of the 70 employees amounts to $2000 every two weeks.—*Youngstown News Register.*

The Struthers furnace is expected to blow out July 9.

ILLINOIS.

The Northwestern Steel Wheel Co. is the name of a new concern just incorporated in Chicago, with a capital of $20,000, for the manufacture of a new patent agricultural steel wheel. The works are to be erected at once at the north end of the Chicago Steel Works.

The Fowler Rolling Mill Co. have recently doubled their capacity for the manufacture of the Fowler spike, by the placing in of an additional train of rolls, a 100-horse-power engine and boiler and additional furnaces. By some improvements lately made by Mr. Fowler, he is enabled to carry an old rail from the furnace and convert it into finished spikes in 14 seconds. By this process the usual reheating of the iron is obviated. The company have just purchased the remainder of the block adjoining their works, which will give them the necessary enlargement of their plant.—*Chicago Industrial World.*

The Preble Machine Works Co., of Chicago, are running their works 13 hours a day, and have orders on their books for 42 wood-working machines.

The Shumway & Burgess Bolt Co., of Chicago, have increased their capital stock to $30,000.

MISSOURI.

The Groom Shovel Co., of St. Louis, are running their works to full capacity, single turn, and are turning out 100 shovels per day. Their order book has few blank pages.

The South St. Louis Foundry Co. are busy with orders for ice-making machinery, and report a better outlook for business than they have seen in a year. They have recently made and shipped several large steam shovels.

Extended Smoke-Boxes in Locomotives.

In reporting upon the benefits derived from the use of the extended smoke-box, or spark-arrester, at the recent convention of the Master Mechanics' Association at Chicago, Mr. J. S. Patterson stated that his two and one-half years' experience in its use, and the expressed opinion of several master mechanics of long experience, found it beneficial to this extent, namely: economy in fuel, cones, netting, smoke-stacks, &c. It also promoted free and regular steaming qualities, insuring against fires, and guaranteeing cleanliness to both train and engine. As a rule, with a train consisting of from four to six ordinary coaches, and a fair quality of coal, such as is used upon Western roads, the locomotive will deposit from 40 to 50 bushels of sparks into the extended smoke-box in 100 miles run. This of itself is appreciated by the passengers, and is quite an advertisement for the road. In point of economy there is a saving in fuel, but to what extent Mr. Patterson was unable to state, but certainly some, since they could use from ¼ to ½ inch larger exhaust openings, thereby gaining a better steaming engine, and consequently a saving in fuel. Mr. James Meehan, general master mechanic, C., N. O. and T. P. Railway, claims a 20 per cent. saving in fuel compared with the old diamond stack and lift pipe. Mr. Meehan, in connection with the extended smoke-box, also uses the brick arch in fire-box. Mr. Patterson found quite a saving in netting, cones, smoke-stacks, &c., as these several parts used with the extended smoke-box will last about as long as any other part of the box or boiler, there being no hammering of sparks to wear them out.

In his opinion there was no question as to the merits of the extended smoke-box, straight stack, high exhaust and diaphragm plate, but it is like all other parts of the engine—if the work is not properly done the engine will not do well. Roads that have tried the extended smoke-box and pronounced it a failure probably had it applied to their boilers in an improper manner.

It is highly important that both the smoke and extended arches be as near air-tight as it is possible to make them—in fact, should be as air-tight as the boiler is steam-tight. If attention is paid to their construction and the work properly executed they cannot fail to be a success and improvement over the old diamond stack, cone and netting.

Mr. Patterson further stated that Mr. Meehan informed him that his company paid last year for fires on their Lexington division $30,000 when using the old diamond stack, and on the same division this year by using the extended smoke-box there were no fires. The annexed statement from Mr. Meehan shows the saving in fuel of different engines on the C., N. O. and T. P. Railway by the use of the extended smoke-box and brick arch in fire-box, as against the old diamond stack:

WITHOUT EXTENDED SMOKE-BOX—1882.

No. of engine.	Size of cylinders.	Mileage.	Service.	Coal consumed.	Pounds per mile.
9	16 × 24	5,192	Pass.	2,860	44
45	17 × 24	5,032	Pass.	4,020	64
38	18 × 24	2,018	Freight	2,465	98
17	17 × 24	2,649	Freight	2,982	90
21	17 × 24	2,370	Freight	2,800	99
27	17 × 24	5,143	Pass.	4,345	68
43	18 × 24	2,858	Freight	3,045	85
46	17 × 24	4,740	Pass.	4,282	72

WITH EXTENDED SMOKE-BOX—1883.

No. of engine.	Mileage.	Service.	Coal consumed.	Pounds per mile.	Saving in favor of the extended smoke-box.
9	4,430	Pass.	1,860	34	10
45	4,757	Pass.	2,625	44	20
38	2,492	Freight	2,050	66	32
17	2 291	Freight	1.825	64	26
21	2,418	Freight	1,625	54	47
27	5,320	Pass.	3,175	48	20
43	2,485	Freight	2,075	67	18
46	4,756	Pass.	2,875	48	24

Lighting the Suez Canal.—M. F. de Lesseps recently informed the French Academy of Sciences that the Suez Canal Co. had determined to cut a second canal through the Isthmus of Suez, in order to be able to cope with the traffic, which is increasing from day to day to an extent hitherto unprovided for. In the meantime, it is intended to make up for the deficiency by letting ships pass at night as well as during the day. Hitherto, however, it has been found impossible to hit on a satisfactory method of lighting the canal. Instead of the ships having to carry electric lamps, it is in contemplation to put up electric lighthouses on both shores. M. de Lesseps now seeks the co-operation of electricians who are members of the Academy of Sciences, to help him by information and hints likely to insure the success of his enterprise.

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CANTON STEEL WORKS,
CANTON, OHIO.

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FIRE BRICK.
BEST AND CHEAPEST.
Established 1845.
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Dinas and Silica Bricks
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Manufacturers
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AND
Edge Pressed Furnace Blocks,
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Twenty-third Street,
Above Race, PHILADELPHIA.
Twenty years' practical Experience.

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Successors to JOHN R. WATSON, Perth Amboy, New Jersey
Manufacturers of
FIRE BRICK,
FOR ROLLING MILLS, BLAST FURNACES, FOUNDRIES, GAS WORKS, LIME KILNS, TANNERIES, BOILER and GRATE SETTING, GLASS WORKS, &c.
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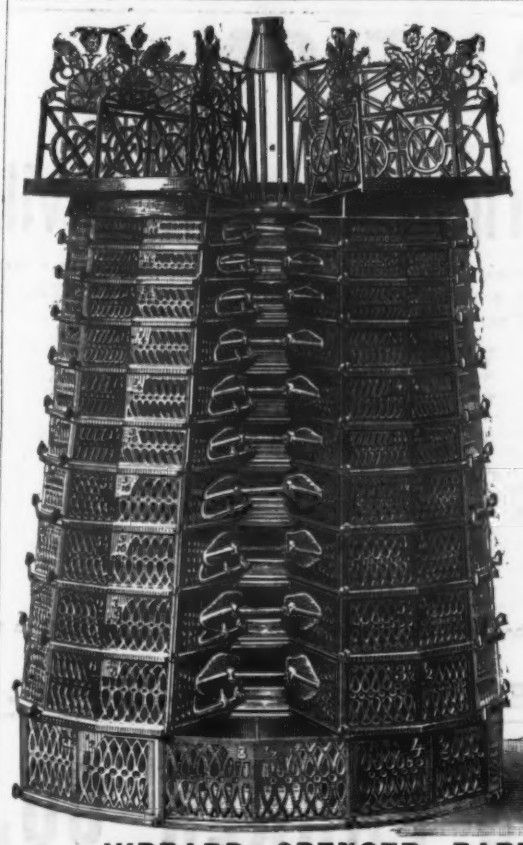

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Height (exclusive of top ornament) 33 inches.
Diameter (at bottom), 28 inches.
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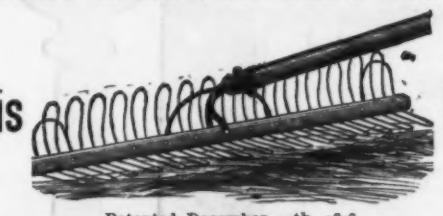
A PERFECT RAKE FOR CLEANING LAWNS.
The Davis  Lawn Rake
Patented December 17th, 1878.
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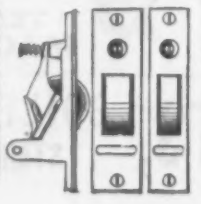
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The Iron Age Directory

and Index to Advertisements.

Agricultural Implements. PAGE
Grant Fan Mill and Cradle Co., Melrose, N. Y. 9
Nellis, McIntire & Co., Pittsburgh, Pa. 40

Air Compressors.
Clayton Steam Pump Works, Brooklyn, N. Y. 44
The Norwalk Iron Works Co., S. Norwalk, Conn. 44

Alarm Money Drawers.
Oneida Alarm Till Co., East Syracuse, N. Y. 10
Tucker Alarm Till Co. 10

Anti-Friction Metals.
Reeves Paul S., Philadelphia. 46

Anvils. *Manufacturers of.*
Boker Hermann & Co., 101 and 103 Duane, N. Y. 36
Fisher & Norris, Trenton, N. J. 9
Wright Peter & Sons. 29

Apple Parers.
Reading Hardware Co., Reading, Pa. 37
Sayre L. A., 28 Orange st., Newark, N. J. 37

Arms and Ammunition.
Conway T. G., 88 Chambers, N. Y. 11
Field Alfred & Co., 93 Chambers, N. Y. 10
Remington E. & Sons, 283 Broadway, N. Y. 40
Smith, Otis A., Rockfall, Conn. 33
Stevens J. & Co., Chicopee Falls, Mass. 12

Artesian Well Supplies.
Lovejoy & Drake, 101 Reade, N. Y. 24

Asbestos.
The Asbestos Packing Co., Boston, Mass. 30

Atomizers.
Rowland, Thos. F., Brooklyn, N. Y. 11

Attorney at Law.
Webster, J. H. Cleveland, O. 44

Axles, Springs, &c., *Manufacturers of.*
Concord Axle Co., Fisherville (Concord), N. H. 33
Cook R. & Sons, Winsted, Conn. 13
Gautier Steel Dpt. of Cambria Iron Co, Johnstown, Pa. 38&38
Wurster F. W., Brooklyn N. Y. 46

Band Saws.—Sniggs & Co., Buffalo, N. Y. 42

Band Saw Filing Machine.
Goodell & Waters, Philadelphia, Pa. 35

Bankers.
P. W. Gallaudet & Co., 2 Wall, N. Y. 24

Barb Wire and Fence.
Hawk Eye Steel Barb Fence Co., Burlington, Iowa 41
Iowa Barb Wire Co., 99 John, N. Y. 2
Middleton C. W. & H. W., Philadelphia, Pa. 9
Ohio Steel Barb Fence Co., Cleveland, O. 37
Washburn & Moen Mfg. Co., Worcester, Mass. 2

Bellows, *Manufacturers of.*
Flaccus Wm. & Son, Pittsburgh, Pa. 9
Scott Geo. M. Chicago, Ill. 37

Bells.
The Miller Co., Canton, O. 41

Bells (Sleigh.)
Bevin Bros. Mfg. Co., Easthampton, Conn. 38

Belt Hooks.
Browning, Sisum & Co., 85 Chambers, N. Y. 2

Belting, *Makers of.*
Alexander Bros., 412 N. 3d, Philadelphia 35
N. Y. Belting and Packing Co., 29 Park Row, N. Y. 13

Belt Oil.—Post E. L. & Co., 10 Peck Slip, N. Y. 17

Belt Protectors.
Lewis Edward S., Albany, N. Y. 39

Bicycles.
Pope Mfg. Co., 597 Washington, Boston. 46

Bird Cages. *Makers of.*
Gunther G., 16 Park Place, N. Y. 3
Lindeman O. & Co., 254 Pearl, N. Y. 3
Maxwell John, 247 and 249 Pearl, N. Y. 7

Blacksmith's Drills.
Illinois Iron and Bolt Co., Carpentersville, Ill. 36

Blasting Materials.
Hercules Powder Co., Cincinnati, O. 39

Blocks, Tackle. *Makers of.*
Bagnall & Loud, Boston, Mass. 43
McCoy & Sanders, 26 Warren, N. Y. 40
McMillan Wm. H. & Bro., 113 South, N. Y. 46
Michigan Block Works, Detroit, Mich. 46
Penfield Block Co., Lockport, N. Y. 16

Boilers, How to Keep Clean.
Hotchkiss J. F., 84 John, N. Y. 12

Boilers, Steam.
Edge Moor Iron Company, 73 Liberty, N. Y. 17
Harrison Boiler Works, Philadelphia, Pa. 45
Lowe & Watson, Bridgeport, Conn. 30
McNeil, James & Bro., Pittsburgh, Pa. 39

Bolt and Rivet Clippers.
Chambers, Brother & Co., Philadelphia, Pa. 38

Bolt and Screw Cases.
Am. Bolt and Screw Case Co., Dayton, O. 40
Westphal Henry, Chicago, Ill. 40

Bolt Cutters.
Howard Iron Works, Buffalo, N. Y. 39
Novelty Iron Works, Cleveland, Ohio. 20
Sellers Wm. & Co., Phila., and 79 Liberty st., N. Y. 45
Wiley & Russell Mfg. Co., Greenfield, Mass. 43

Bolts.—American Bolt Co., Lowell, Mass. 43
Wm. H. Haskell Co., Portucket, R. I. 43
Lovejoy & Drake, 101 Reade, N. Y. 25
Moore, S. H. & E. Y., Chicago. 35
Pawtucket Mfg. Co., Pawtucket, R. I. 12

Boring Machines.
W. B. Wells Mfg. Co., Ashaway, R. I. 40

Boxes for Hardware.
Green S. H., 12 Murray, N. Y. 30

Brass, *Manufacturers of.*
Ansonia Brass and Copper Co., 19 Cliff, N. Y. 2&39
Bridgeport Brass Co., Bridgeport Conn. 2
Brown & Bros., 81 Chambers, N. Y. 2
Davol John & Sons, 100 John, N. Y. 2
Detroit Copper and Brass Rolling Mills, Detroit, Mich. 2
Holmes, Booth & Haydens, 49 Chambers, N. Y. 2
Plume & Atwood Mfg. Co., 18 Murray, N. Y. 2
Rome Iron Works, Rome, N. Y. 2
Scovill Mfg. Co., 421 Broome, N. Y. 2
Waterbury Brass Co., 396 Broadway, N. Y. 2
Waterbury Mfg. Co., Waterbury, Conn. 3

Brass Butt Hinges.
Tiebout W. & J. 16 and 18 Chambers, N. Y. 35

Brass Founders.
McFarland Wm., Trenton, N. J. 45
Lunkenheimer F., Cincinnati, O. 42
Reeves Paul S., Philadelphia. 46
Reynolds Martin, Brooklyn, E. D., N. Y. 44

Bridge Builders.
Moseley Iron Bridge and Roof Co., 5 Dey, N. Y. 4

Bronze Bearings.
Am. Bronze Works, Cleveland, O. 45

Buckets, Pump and Elevator.
Rowland T. F., Brooklyn, N. Y. 46

Builders' Hardware.
Clark Mfg. Co., Buffalo, N. Y. 33
Whipple Mfg. Co., Cleveland, O. 13

Butcher and Shoe Knives. *Manufacturers of.*
Wilson John, Sheffield, England. 10

Butts and Hinges.
Stanley Works, New Britain, Conn. 31
Union Mfg. Co., 96 Chambers, N. Y. 7

Cabinet Locks.
Yale & Towne Mfg. Co., Stamford, Conn. 11

Car Axles.
Roberts A. & P. & Co., 264 S. 4th, Philadelphia. 4

Carriage Bolts. *Makers of.*
Townsend, Wilson & Hubbard, Philadelphia. 43

Carriage Hardware. *Makers of.*
Liggett Spring and Axle Co., Pittsburgh, Pa. 8
Smith H. D. & Co., Plantsville, Conn. 32

Carts —C. Spring Cart Co., Rushville, Ind. 42

Casters.—Phœnix Caster Co., Indianapolis, Ind. 10
Payson Mfg. Co., Chicago, Ill. 10
Yale Caster Co., New Haven, Conn. 41

Castings, Brass and Iron.
Whipple Mfg. Co. 13

Castings, Iron.
Bowler & Co., Cleveland, Ohio. 6
S. Cheney & Son, Manlius, N. Y. 39
Devlin Thos. & Co., Philadelphia, Pa. 7
Haight & Clark, Albany N. Y. 9
Hammer & Co., Branford, Conn. 10
Riverside Foundry Works, Cleveland, Ohio. 3
Sharon Valley Mal. and Gray Iron Co., Sharon Valley, Conn. 30
Syracuse Malleable Iron Works, Syracuse, N. Y. 4
Youngstown Malleable Iron Co., Youngstown, O. 7

Castings, Steel.
Chester Steel Castings Co., 407 Library, Phila., Pa. 46
Eureka Cast Steel Co., Chester, Pa. 46
Flagg Stanley G. & Co., Philadelphia. 46
Mackintosh, Hemphill & Co., Pittsburgh, Pa. 46
Pittsburgh Steel Casting Co., Pittsburgh, Pa. 46

Chains, *Manufacturers of*
Bradley & Co., 818 Richmond St., Phila., Pa. 5

Chemicals
Eimer & Amend, 205 Third Ave., N. Y. 16

Chisels, *Manufacturers of.*
Buck Bros., Millbury Mass. 13

Civil Engineer and Geologist.
Randolph B. S., Martinsburg, W. Va. 32

Clay Pigeons and Traps.
The Clay Pigeon Co., Cincinnati, O. 36

Clock Springs, &c,
Dunbar Bros., Bristol, Conn. 7

Clothes Dryers.
Hill Dryer Co., Worcester, Mass. 32

Coal, *Miners of.*
Pardee A. & Co., 111 Broadway, N. Y. 38

Coal Hods.
Easterbrook Wm., Philadelphia, Pa. 27

Coffee and Spice Mills.
Lane Brothers, Poughkeepsie, N. Y. 30
Enterprise Mfg. Co., Philadelphia, Pa. 33

Coke.—Schoonmaker, J. M., Pittsburgh, Pa. 30

Commission Agents.
Mustard & Co., Shanghai, China. 37

Compasses and Calipers, *Manufacturers of.*
Bemis & Call Hdw. & Tool Co., Springfield, Mass. 29&33
Stevens J. & Co., Chicopee Falls, Mass. 12

Copper.—Brown & Bros., 81 Chambers, N. Y. 2
New Haven Copper Co., 290 Pearl, N. Y. 2
Pope, Cole & Co., Baltimore, Md. 3
Pope Thos. J & Bro., 292 Pearl, N. Y. 4

Cordage.
Elizabethport Steam Cordage Co., 43 South, N. Y. 34

Corrugated Iron.
Merchant & Co., Philadelphia, Pa. 27
Moseley Iron Bridge and Roof Co., 5 Dey, N. Y. 4

Coverings, Boiler and Pipe.
Chalmers Spence Co., 23 John St., N. Y. 32

Crucibles.
Seidel R. B., Philadelphia, Pa. 41

Cupolas.
Smith & Sayre Mfg. Co., 245 Broadway, N. Y. 48

Cutlery, *Importers of.*
Boker Hermann & Co., 101 Duane, N. Y. 36
Conway T. G., 88 Chambers, N. Y. 11
Clatworthy F. & W., 82 Chambers, N. Y. 10

Cutlery, *Manufacturers of.*
Bannister A. F. & Co., Newark, N. J. 10
John Russell Cutlery Co., Turners Falls, Mass. 46

Dog Collars.
Medford Fancy Goods Co., 96 Duane, N. Y. 9
Pope & Stevens, 114 Chambers, N. Y. 37

Dinner Pail and Lantern.
Haight Joseph, Port Chester, N. Y. 8

Door Hangers, House and Barn.
Lovejoy & Drake, 101 Reade, N. Y. 25
Moore S. H. & E. Y., Chicago, Ill. 35
Stearns E. C. & Co., Syracuse, N. Y. 46

Drill Braces.
Millers Falls Co., 74 Chambers, N. Y. 28

Drilling Machines. *Makers of.*
Clark, Sintz & Co., Springfield, O. 46
Dallett Thos. H. & Co., Philadelphia, Pa. 44
E. L. Harrington, Philadelphia, Pa. 45
Peerless Punch & Shear Co., 115 Liberty, N.Y. 45
Wiley & Russell Mfg. Co., Greenfield, Mass. 37

Drop Forgings.
The Billings & Spencer Co., Hartford, Conn. 32
Brown R. H. & Co., Westville, Conn. 41

Drop Hammers.
Williams, White & Co., Moline, Ill. 16

Eaves Trough Hanger.
Heartley Geo. W., Toledo, O. 36

Edge Tools. *Makers of.*
Doscher M., 84 Chambers, N. Y. 43

Elevators. *Makers of.*
Clem & Morse, Philadelphia Pa. 45
Crane Bros. Mfg. Co., Chicago, Ill. 42&44
Eaton & Prince, Chicago, Ill. 32
Stokes & Parrish, Philadelphia. 44
Tewksbury Automatic Elevator Co., Newark, N. J. 12

Emery and Corundum Wheels.
Vitrified Wheel Co., Westfield, Mass 39

Emery Wheels.
Union Stone Co, Boston, Mass. 32

Engines, Fire.
La France Fire Engine Co., Elmira, N. Y. 43

Engines, Gas.
Schleicher, Schumm & Co., Philadelphia. 45

Engines, Locomotive.
Baldwin Locomotive Works, Philadelphia, Pa. 6

Engines, Steam. *Makers of.*
Cooke & Co., 12 Cortlandt, N. Y. 9
Cox & Sons, Philadelphia, Pa. 45
Dunbar, R. & Son, Buffalo, N. Y. 44
Ervien Chas. W. & Co., Philadelphia, Pa. 45
Noteman Rotary Engine & Pump Co., Toledo, O. 45
Ramsey L. Mfg. Co., St. Louis, Mo. 42
Southwark Foundry & Machine Co., Philadelphia. 45
The Cummer Engine Co., Cleveland, O. 29
The Norwalk Iron Works Co., S. Norwalk, Conn. 44
The Pusey & Jones Co., Wilmington, Del. 44
Wetherill Robt. & Co., Chester, Pa. 45

Facings, Foundry.
Am. Facing Co., 517 W. 15th, N. Y. 32
Emerick, J. A. & Co., Philadelphia, Pa. 3
Paxson J. W. & Co., 514 Beech, Phila. 5

Faucets, *Makers of.*
McNab & Harlin Mfg. Co., 30 Gold, N. Y. 43
North Brothers, Philadelphia, Pa. 25

Faucets, *Self-Measuring, Makers of.*
Enterprise Mfg. Co., of Pa., Phila. and N. Y. 33
Lane Bros., Poughkeepsie, N. Y. 30

Feed Cutters.
Ross E. W. & Co., Fulton, N. Y. 39

Fences, Wrought Iron.
E. T. Barnum Wire and Iron Works, Detroit, Mich 33
National Wire and Iron Co., Detroit, Mich. 36
Van Dorn Iron Works, Cleveland, O. 12

Files, *Importers of.*
Field Alfred & Co. 93 Chambers, N. Y. 10
Carr J. & Riley 30 Geld, N. Y. 38
Montgomery & Co., 105 Fulton, N. Y. 40
Moss F. W., 80 John, N. Y. 38

Files, *Manufacturers of.*
Auburn File Works, 89 Chambers, N. Y. 6
Barnett G. & H., 41 and 43 Richmond, Phila. 6
Detroit File Works, Detroit, Mich. 8
Everhart James M., Scranton, Pa. 45
Henssler Christian, Philadelphia, Pa. 8
Hiscox File Mfg. Co., West Chelmsford, Mass. 8
Johnson & Bro., 1 Commercial, Newark, N. J. 8
McCaffrey & Bro., 1732 and 1734 N. 4th, Phila. 8
Nicholson File Co., Providence, R. I. 8
Paul Chas. H., Williamsburgh, N. Y. 8
Spencer, Mathias & Sons, Sheffield, England. 10
Union File Works, Baltimore, Md. 8

Fire Brick. *Makers of.*
Boerner & O'Brien, Philadelphia, Pa. 30
Climax Fire Brick Co., Pittsburgh, Pa. 37
Colson Chas. D., Chicago, Ill. 30
Evens & Howard, St. Louis, Mo. 6
Gardner Brothers, Pittsburgh, Pa. 30
A. Hall Terra Cotta Co., Perth Amboy, N. J. 30
Hall & Sons, Buffalo, N. Y. 30
Kreischer B. & Sons, foot of E. Houston, N. Y. 30
Maurer Henry, 418 East 2nd, N. Y. 30
Newton & Co., Albany, N. Y. 30
Ostrander James & Son, Troy, N. Y. 30
Perth Amboy Terra Cotta Co., 30 and 31 Astor House, New York. 30
Rimington S. A., 40 and 42 Broadway, N. Y. 30
Union Mining Co., Philadelphia, Pa. 30
Valentine M. D. & Bro., Woodbridge, N. J. 30
Watson Fire Brick Co., Perth Amboy, N. J. 30
Woodland Fire Brick Co., Woodland, Pa. 30

Fishing Reels.
Malleson, Fred'k, Brooklyn, E. D., N. Y. 10

Fittings, Malleable and Gray Iron.
Star Machine Works, Cleveland, O. 37

Flue Cleaners.
Cleveland Flue Cleaner Mfg. Co., Cleveland, O. 36

Fluor Spar.
Burbank B. & Co., Evansville, Ind 30

Fluters.
Graham & Haines, 113 Chambers, N. Y. 8

Forges, Portable, &c.
Buffalo Forge Co., Buffalo, N. Y. 15
Holt Mfg. Co., Cleveland, O. 43
Keystone Portable Forge Co., 218 Carter, Phila. 16

Forgings, Iron and Steel.
Alker & Cromlish, Allegheny, Pa. 4
Temple & Lockwood, 12 Platt, N. Y. 38

Foundry Supplies.
Am. Facing Co., 517 W. 15th, N. Y. 32
Emerick J. A. & Co., Philadelphia, Pa. 3

Furnace Hoists.
Stokes & Parrish, Phila., Pa. 44

Furnaces, *Makers of.*
Richmond & Potts, 119 S. 4th, Phila., Pa. 5

Grain Scoops.
Hussey, Binns & Co., Pittsburgh, Pa. 27

Grate Bars.
Creswell David S., Philadelphia, Pa. 45
Salamander Grate Bar Co., 119 Liberty, N. Y. 30

Grindstones.
Lombard & Co., Boston, Mass. 33
McDermott & Beres Stone Co., Cleveland, O. 33
Ohio Grindstone Co., Cleveland, O. 33
Wood Walter R., 261 and 264 Front, N. Y. 33
Worthington & Sons, Cleveland, O. 17

Gunpowder, *Makers of.*
Laflin & Rand Powder Co. 20 Murray, N. Y. 42

Guns, Pistols, &c.
Kittredge B. & Co., Cincinnati, O. 10

Hammers.
Hartford Hammer Co., Hartford, Conn. 39

Hammers, Steam.
Bradley & Co., Syracuse, N. Y. 46

Hammock Chairs.
Livingston Horse Nail Co., 104 Reade, N. Y. 16

Hand Force Pumps.
Union Mfg. Co., 96 Chambers, N. Y. 7

Handles (Hammer).
Musselman & Son, Quakertown, Pa. 7

Handles (Hickory).
McCullough, Woodbury & Co., Knoxville, Tenn. 35

Handles, Tool.
Jennings C. E. & Co., 96 Chambers, N. Y. 35

Handles and Spokes.
Hundley V. G., 79 Reade, N. Y. 40

Hardware Commission Merchants.
Field Alfred & Co., 93 Chambers, N. Y. 10
Lovejoy & Drake, 101 Reade, N. Y. 24

Hardware Dealers.
Lloyd, Supplee & Walton, 625 Market, Phila. 24

Hardware Importers.
Baker Hermann & Co., 101 Duane, N. Y. 36
Field Alfred & Co., 93 Chambers, N. Y. 10

Hardware Manufacturers.
Enterprise Mfg. Co., Phila. 33
Lloyd, Supplee & Walton, 625 Market, Phila., Pa. 24
Miller's Falls Co., 74 Chambers, N. Y. 28
Shepard Hardware Co., Buffalo, N. Y. 35
Stanley Works, New Britain, Conn. 33
Trenton Lock & Hardware Co., Trenton, N. J. 10
Union Mfg. Co., 96 Chambers, N. Y. 7
Whipple Mfg. Co., Cleveland, O. 13

Hardware Specialties.
American Machine Co., 126 Chambers, N. Y. 43
Hotchkiss G. M. & Co., West Haven, Conn. 3
Kyser & Rex, Philadelphia, Pa. 35
Moore S. H. & E. Y., Chicago. 35
Shepard Hardware Co., Buffalo, N. Y. 35
Spencer & Underhill, 94 Chambers, N. Y. 10

Harness Snaps.
Covert Mfg. Co., West Troy, N. Y. 33
Union Hdw. Mfg. Co., West Troy, N. Y. 30

Hay Knives.
Hiram Holt & Co., East Wilton, Me. 45

Heater and Purifier, Feed Water.
Lowe & Watson, Bridgeport, Conn. 30

Hinges.
Stanley Works, New Britain, Conn. 31
Union Mfg. Co., 96 Chambers, N. Y. 7

Hoes,—Bruce George W., 1 Platt, N. Y. 9

Hog Ringers.—Blair E., Bucyrus, O. 42
Chambers, Bering & Quinlan, Decatur, Ill. 33
H. W. dill & Co., Decatur, Ill. 32

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Crane Bros., Mfg. Co., Chicago, Ill. 42&44
Frisbie D. & Co., Philadelphia, Pa. 45
Rumsey L. M. & Co., St. Louis, Mo. 42

Hoisting Machines.
Box Alfred & Co., 312 Green, Phila. 37
Clem & Morse, Philadelphia, Pa. 45
Moore S. H. & E. Y., Chicago. 35
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y. 45
Stokes & Parrish, Phila., Pa. 44

Hose Reels.
Carr & Hobson, 47 Cliff, N. Y. 16
Wheipley R. H., Chicago, Ill. 36

Hoists, Portable.
Dunn J. Cleveland, Ohio. 43

Hooks (Cotton & Bale.)
New York Handle & Mallet Works, 456 E. Houston. 13

Horse Hay Forks.
Waldron & Sprout, Muncy, Pa. 13

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Essex Horse Nail Co., Troy, N. Y. 6
National Horse Nail Co., Vergennes, Vt. 25
New Haven Horse Nail Co., 103 Chambers, N. Y. 12
Saranac Horse Nail Co., Plattsburg, N. Y. 12

Horse Rasps and Files,
Heller & Bro., Newark, N. J. 8

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Schoenberger & Co., Pittsburgh, Pa. 4
The Burden Iron Co., Troy, N. Y. 4

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Witherow & Gordon, Pittsburgh, Pa. 16

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McLean John, 300 Monroe, N. Y. 10
Eddy Valve Co., Waterford, N. Y. 43

Hydraulic Jacks.
Dudgeon Richard, 24 Columbia, N. Y. 9
Watson & Stillman, 470B Grand, N. Y. 45

Ice Cream Freezers.
Roebuck S. & Co., 764 Fulton, N. Y. 32
White Mountain Freezer Co., Nashua, N. H. 27

Ice Tools.
Heartley Geo. W., Toledo, O. 36

Injectors.—Jenks James, Detroit, Mich. 42
Flammang Injector Co., Cleveland, O. 37

Inspirators.
Fairbanks & Co., 311 Broadway, New York. 44

Insurance, Boiler.
Hartford Steam Boiler Inspection & Insurance Co. 32

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Froment Frank L. 112 John st., N. Y. 4
Hoffman J. W. & Co., 308 S. 4th, Phila. 5
Levis Henry & Co., Philadelphia, Pa. 5
Lundell Chas. G. (Swedish), Boston, Mass. 6

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Albany & Rensselaer Iron & Steel Co., Troy, N. Y. 38
Birmingham Rolling Mill Co., Louisville, Ky. 6
Britton Iron and Steel Co., Cleveland, O. 6
Burden Iron Company, Troy, N. Y. 4
Calumet Iron & Steel Co., Chicago, Ill. 6
Keystone Rolling Mill, Limited, Pittsburgh, Pa. 4
Kirkpatrick & Co., Pittsburgh Pa. 4
Leavitt, C. W., 161 Broadway, N. Y. 4
Leonard John, 450 West St., N. Y. 4
Montour Iron & Steel Co., Danville, Pa. 38
Phœnix Iron Co., 410 Walnut, Philadelphia 5
Roane Iron Co., Chattanooga, Tenn. 6
Rome Merchant Iron Mills, Rome, N. Y. 4
Rowland James & Co., 920 N. Delaware ave., Phila. 5
Rowland Wm. & Harvey, Philadelphia. 46
Shoenberger & Co., Pittsburgh, Pa. 4
Springfield Iron Co., Springfield, Ill. 6
The Passaic Rolling Mill Co., Paterson, N. J. 4
Ulster Iron Works, 90 Broadway, N. Y. 4
Wood Alan & Co., Arch, Philadelphia. 4

Iron Brokers.
Blakey & Walbaum, Philadelphia, Pa. 5
Boynton Geo. A., 70 Wall, N. Y. 6
Etting Edward J., Philadelphia, Pa. 42
Fox & Drummond, 68 Wall, N. Y. 4
Smith E. D., Philadelphia, Pa. 5
Watts Ethelbert, Philadelphia, Pa. 5

Iron, Charcoal. *Warm or Cold Blast.*
Hernsheim L. (Austrian), 20 Nassau, N. Y. 6
Lundell Chas. G. (Swedish), Boston, Mass. 6
Quincy John W. & Co., 98 William, N. Y. 4

Iron Commission Merchants.
Groome, Roberts & Co., Philadelphia, Pa. 5
Heberton & Co., Philadelphia. 5
Hernsheim L., 20 Nassau, N. Y. 6
Lea J. Tatnall & Co., Philadelphia. 5
Lundberg Gustaf, Boston, Mass. 39
Lundell Chas. G., Boston Mass. 6
Mohr J. J., 420 Walnut, Philadelphia. 5
Wister L. & R. & Co., Philadelphia, Pa. 5

Iron Dealers.
Abeel Brothers, 190 South, N. Y. 4
Abbott Jere & Co., New York and Boston. 4
Bonnell, Botsford & Co., Youngstown, O. 39
Borden & Lovell, 70 and 72 West, N. Y. 4
Carmichael & Emmens, 130 and 132 Cedar, N. Y. 4
Cooney Daniel F., 58 Washington, N. Y. 4
Cox Justice, Jr., & Co., Philadelphia, Pa. 5
Egleston Bros & Co., 160 South, N. Y. 4
Gill Mathew, Jr., & Co., Philadelphia, Pa. 5
Harrison & Gilloon, 448 to 462 Water, N. Y. 4
Heathfield, Eyre & Co., London, England. 17
Hoffman J. W. & Co., 308 S. Fourth, Philadelphia. 5
Hubbard Chas., 46 Cliff, N. Y. 4
Judson B. F., 457 and 459 Water, N. Y. 4
Keeley Jerome & Co., Philadelphia, Pa. 4
Lovejoy & Drake, 101 Reade, N. Y. 25
Lloyd & Lindsay, Philadelphia. 5
Lundberg Gustaf, 38 Kilby, Boston, Mass. 39
Lundell Chas. G. (Swedish), Boston, Mass. 6
Middleton W. S., 43 John, N. Y. 4
Naylor & Co., 99 John, N. Y. 38
Ogden & Wallace, 84, 87, 89 and 91 Elm, N. Y. 4
Pierson & Co., 24 Broadway, N. Y. 4
Pullman J. Wesley, Philadelphia, Pa. 5
Quincy John W & Co., 98 William, N. Y. 4
Wallace Wm. H. & Co., Albany and Washington streets, N. Y. 4
Wilson E. H. & Co., Philadelphia, Pa. 5
Whitney A. R. & Co., 48 Hudson, N. Y. 4

Iron Fences.
Champion Iron Fence Co., Kenton, O. 32

Iron Founders.
Bannan Fras. R., Pottsville, Pa. 6

Iron, Pig. *Importers of.*
Abbott Jere & Co. (Swedish), New York & Boston. 39
Hubbard, Chas., 46 Cliff, N. Y. 4
Lee James & Co., 72 Pine, N. Y. 4
Lundberg Gustaf, Boston, Mass. 39
Lundell, Chas. G. (Swedish), Boston, Mass. 6
Richardson, J. O., Philadelphia. 5
Ross, James W., Chicago, Ill. 4
Wessels Ed. J., 17 Cedar, N. Y. 4
Williamson James & Co., 69 Wall N. Y. 4

Iron, Sheet. *Manufacturers of.*
Jersey City Galvanizing Co., Jersey City, N. J. 4
Lefferts, Marshall & Co., 90 Beekman, N. Y. 4
Wood W. D. & Co., Pittsburgh, Pa. 4

Iron, Steel and Nails.
Morris, Wheeler & Co., 14 Cliff, N. Y. 5

Lanterns, *Manufacturers of.*
Dietz R. E., 51 and 56 Fulton, N. Y. 46
Howard & Morse, 45 Fulton, N. Y. 2

Lathes, Pulley Blocks, Drills.
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Lawn Mowers.
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Smith & Egge Mfg. Co., Bridgeport, Conn. 41
Taylor Mfg. Co., New Britain, Conn. 17
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The Charles Parker Co., Meriden, Conn. 29
Yale & Towne Mfg. Co., Stamford, Conn. 11
Whipple Mfg. Co., Cleveland, O. 13

Lubricator Cups.
Detroit Lubricator Co., Detroit, Mich. 12

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Adt John, New Haven, Conn. 40
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Garvin E. E. & Co., 130 Centre, N. Y. 44
Peerless Punch and Shear Co., 98 W. Dey, N. Y. 45
Pittsburgh Mfg. Co., Pittsburgh, Pa. 43
Purdy Machine Co, Cleveland, O. 41
Sellers Wm. & Co., Phila., and 79 Liberty, N. Y. 45
Smith H. B. Mach. Co., Philadelphia, Pa. 32
Stokes & Parrish Phila., Pa. 44
Stow Flexible Shaft Co., Limited, Philadelphia. 45
The Stiles & Parker Press Co., Middletown, Conn. 46
Wetherill Robert & Co., Chester, Pa. 45

Machinists' Tools and Supplies.
Belcher Wm. H., 89 Chambers, N. Y. 35
Blaisdell P. & Co., Worcester, Mass. 43
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King J. M. & Co., Waterford, N. Y. 8
Sellers Wm. & Co., Phila., and 79 Liberty, N. Y. 45
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Mallets.
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Mills.—Newell's, 10 Barclay, N. Y. 36

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Molding Machines.
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Schoenberger & Co., Pittsburgh, Pa. 4

Nails, Cut.—Blankenship, R. E., Richmond, Va. 7
Ross W. K., 97 Chambers, N. Y. 4

Nail Machinery.
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Nickel Platers' Supplies.
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The Zucker & Levett Chemical Co., 440 to 444 West 16th, N. Y. 37

Norway Shapes, *Rollers of.*
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Rowland Wm. & Harvey, Frankford, Philadelphia 46

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Standard Nut Co., Pittsburgh, Pa. 43

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Oil Stones.
Chase Geo., 107th and Harlem River, N. Y. 33

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Pierson & Co., 24 Broadway, N. Y. 4

Pig Iron.
Bond, Parsons & Co., 104 John, New York. 38
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Shenandoah Iron, Lumber, Mining and Mfg. Co., Philadelphia, Pa. 5

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Pancoast & Maule, 243 & 245 53d st., Philadelphia. 33

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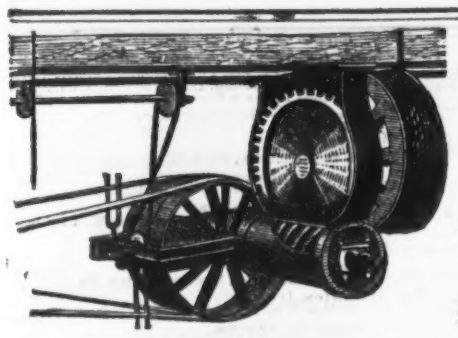
Mellert Foundry and Machine Co., Limited, Reading, Pa. 32
Reading Iron Works, Philadelphia, Pa. 6
Wood R. D. & Co., 400 Chestnut, Philadelphia. 40
Wyckoff A., Elmira, N. Y. 13

Plane Irons. *Manufacturers of.*
Buck Bros., Millbury, Mass. 13

Planes, *Manufacturers of.*
Stanley Rule and Level Co., 29 Chambers, N. Y. 9

Planers.
Brettell Geo. E., Rochester, N. Y.



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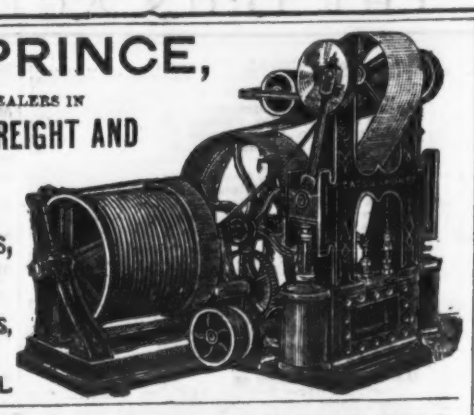

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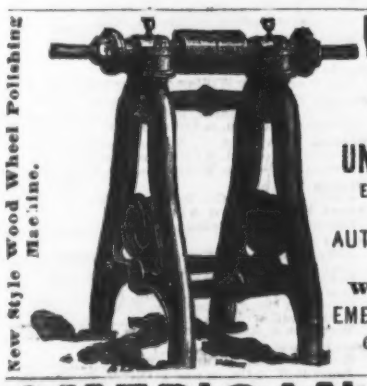

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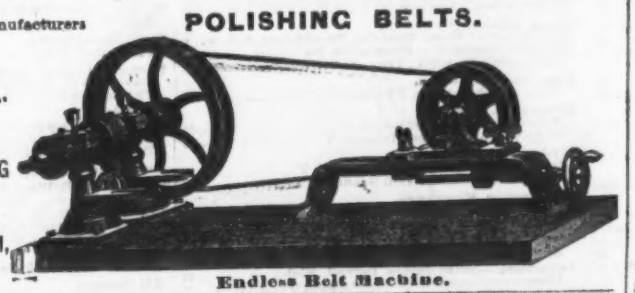

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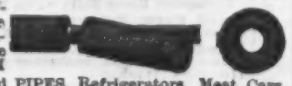

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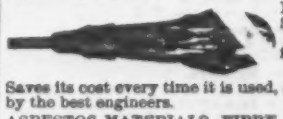

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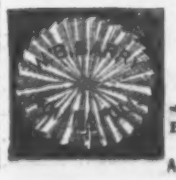

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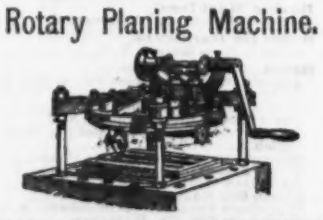

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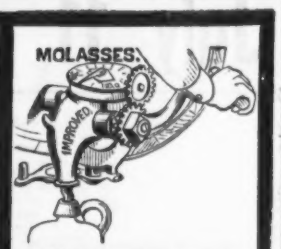

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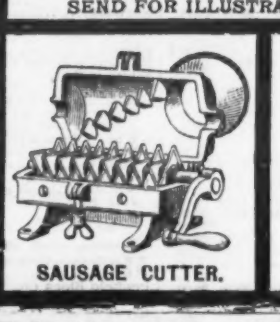
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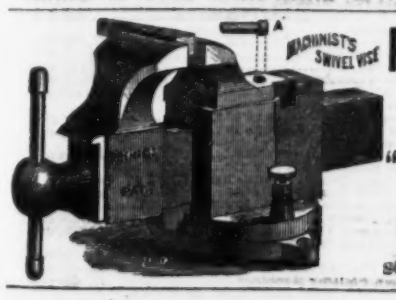

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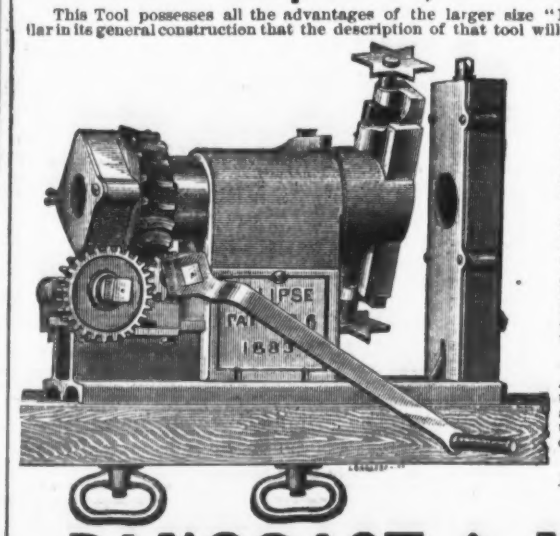

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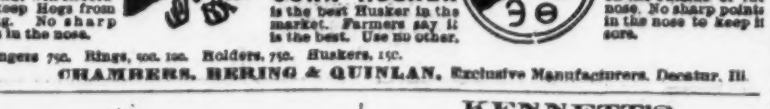

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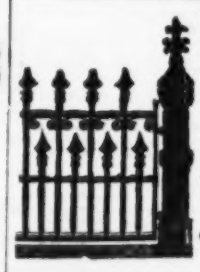

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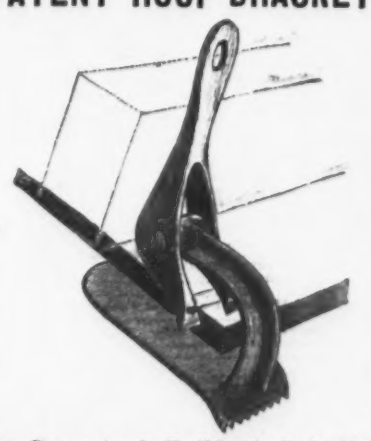

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Awls, Shouldered Brad.....₩ gross $2 70—dis 25&10 %
Awls, Handled Brad.....$7.50 ₩ gross—dis 25&10 %
Awls, Handled Scratch.....$7.50 ₩ gross—dis 25&10 %
Awls, Socket Scratch.....$1.50 ₩ gross—dis 10&10 %
Brad Sets, Aiken's.....₩ doz $12.00—dis 45&10 %
Millers Falls Adj. Tool Hdles,...₩ doz $12—dis 25 %
Brad Sets, No. 42, $10.50; No. 43, $12.50.....dis 70&10&10 %
Brad Sets, Stanley's Excelsior, No. 1, $9.00...dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 2, $14.80...dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 3, $7.80...dis 30&10 %

Axes.
Single Bit, 4¾ to 5¾ and under.....₩ doz 9.00 net
Single Bit, 4¾ to 6 and over.....₩ doz $8.50 net
Single Bit, beveled.....50c ₩ doz advance
Double Bit, 4¾ to 5¾ and under.....₩ doz $15.0c net
Double Bit, 4¾ to 6 and over.....₩ doz $16.00 net
Double Bit, beveled.....$1.00 ₩ doz advance

Axle Grease.
Fraser's.....₩ lb 6c

Axles.
tandard list.....dis 45 %

Balances.
Spring Balances.....dis 33⅓ %

Bells.
Hand, Light Brass.....dis 65&10 @ 70 %
Hand, Extra Heavy.....dis 45 %
Hand, White Metal.....dis 40 %
Hand, Silver Chime.....dis 20&10 %
Hand, Globe (Cone's Patent).....dis 25&10 %
Gong, Abbe's.....dis 20&10 %
Gong, Yankee.....dis 30&10 %
Gong, Barton's.....dis 30&10 %
Crank, Taylor's.....dis 25&10 %
Crank, Brooks'.....dis 50&10&2 %
Crank, Cone's.....dis 10 %
Crank, Connet's.....dis 25&10 %
Lever, Sargent's.....dis 55&20 %
Lever, Taylor's Bronzed or Plated.....net
Lever, Taylor's Japanned.....dis 25&10 %
Lever, R. & E. M. Co.'s.....dis 50&10&2 %
Lever, Reading.....dis 25&10&10 %
Pull, Brook's.....dis 50&10&2 %
Pull, Western.....dis 25&10 %
Cail.....dis 25 %
Cow, Common Wrought.....dis 55&10 %
Cow, Western.....dis 20&10 %
Cow, Western, Sargent's list.....dis 55&10 %
Cow, Kentucky "Star".....dis 50&10 %
Cow, Kentucky Sargent's list.....dis 55&10 %
Cow, Dodge's Genuine Kentucky, new list—
Nos. 0 1 1¾ 4 5 6 Hog
$12.00 10.0 9.0 8.00 7.00 5.00 3.50 2.50 5.00
} dis 60 %
Cow, Texas Star.....dis 40&10 %

Bellows.
Blacksmiths Common.....dis 45 %
Blacksmiths' Extra Pittsburgh Pattern.....dis 20 %
Molders'.....dis 25 %
Hand Bellows.....dis 20 %

Belting, Rubber.
Belting and Packing Co.....dis 50 %

Bit Holders.
Extension, Barber's.....₩ doz $15.00—dis 40&5 %
Extension, Ives'.....₩ doz $150—dis 40 %
Diagonal.....₩ doz $24.00—dis 40 %
Angular.....₩ doz $24.00—dis 40&5 %

Blind Adjusters.—Domestic..₩ doz $3.00—dis 30 %
Excelsior.....₩ doz $16.00—dis 40&10&2 %

Blind Fasteners.
Mackrell's.....₩ doz pairs, $1.00 dis 20&10 %
Van Sand's Screw Pattern.....$9 ₩ gro. dis 10&2 %
Van Sand's Old Pattern.....$9 ₩ gro. dis 10&2 %
Washburn's Old Pattern.....$9 ₩ gro. net
Merriman's.....new list, net
Salisbury & Austin, No. 2008.....$9 per gro. net
Security Gravity.....$9 per gross. net

Blind Staples.
Bar bed, ½ in. and larger.....₩ lb 11c net
Bar bed ⅝ in.....₩ lb 13c net

Blocks.
Penfield Block Co., I. R. and I. Strap'd...
Penfield Block Co., W. I. C. bushed.....
Penfield Block Co., W. I. all steel roll'r..
Penfield Block Co., L. & I Sheaves.....
} New List
} dis 35 %
} dis 35 %
} dis 20 %
} dis 35 %
Stanley Rule & Level Co.'s.....dis 40&10 %

Bolts.
Cast Iron Barrel Shutter, &c.....dis 55&10 %
Cast iron Chain (Sargent's list).....dis 60&10 %
Ives' Patent Door Bolts.....dis 55&10 %
Wrought Barrel.....dis 55&10 %
Wrought Square.....dis 55&10 %
Wrought Shutter, all Iron, Stanley's list...dis 50&10 %
Wrought Shutter, Brass Knob, Stanley's list.dis 50&10 %
Wrought Shutter, Sargent's list.....dis 55&10 %
Wrought Sunk Flush, Sargent's.....dis 70&10 %
Wrought Sunk Flush, Stanley's.....dis 40&10 %
Wrought B. K. Flush. Com'n Stanley's.....dis 55&20&5 %
Carriage and Tire Common.....dis 80@80&10 %
Carriage and Tire, Philadelphia, new list.....dis 70 %
Carriage and Tire, Philadelphia Pattern.....dis 70 %
Union Carriage.....dis 70 %
R. B. & W. Carriage (old list).....dis 65 %
Tire, Am. Screw Co.'s, Phila., new l'st, July 2, 1883.....dis 50 %
Tire, "Bay State," new list, July 2, 1883.....dis 65 %
Tire, R. B. & W., new list.....dis 75&10 %
Stove—American Screw Co.'s.....dis 40 %
Stove, R. B. & W.....dis 40 %
Stove, R. & E. Mfg. Co.....dis 40 %
Plow.....dis 50 %
Plow R. B. & Co.....dis 40 %
Machine.....dis 60&10 %
Bolt Ends.....dis 60&10 %

Borax.
.....10c ₩ lb net

Boring Machines. Upright Angular
First quality, no Augers.....$6.50 $6.75..dis 45@50 %
Phillips, with Augers.....7.00 7.50.....net
Jennings & Co., no Augers.....4.50 6.75.....dis 40 %
Saunders' Patent, Regular Bed, $6.00.....dis 20 %
Saunders' Patent, Extra Bed, $6.50.....dis 20 %

Boxes.
Interchangeable Shelf Boxes.....dis 20 %

Braces
O. S. Backus.....dis 50&50 %
Wilson Mfg. Co.....dis 10 %
Barber's.....dis 40&5 %
Speffard's Patent.....dis 50&5 %
Ives' Patent Braces.....dis 55@55&5 %
Common Ball (American).....dis 55 %
Amidon's.....dis 30 %
Barker's Imp'd.....dis 10 %
Empire.....dis 30 %
Buffalo Ball.....dis 40 %

Brackets.
Shelf, plain.....dis 50&10 %
Shelf, fancy.....dis 60&10 %
Reading, Plain.....dis 50&10 %
Reading, Rosette.....dis 60&10 %

Bright Wire Goods, List of June 25, '83..dis 70&10 %

Bull Rings.
Union Nut Co.....dis 55 %
Sargent's.....dis 66⅔&10 %
Hotchkiss' low list.....dis 15 %
Humason, Beckley & Co.'s.....dis 66⅔&10 %
Peck, Stow & W. Co's.....dis 30½&10 %

Butts.
Wrought Brass.....dis 50&10&5 %
Cast Brass Theobal's.....dis 33⅓ %
Cast Brass, Corbin's Fast Joint.....dis 20&10 %
Cast Brass, Loose Joint.....dis 10&10 %
Fast Joint, Narrow.....dis 45&10 %
Fast Joint, Broad.....dis 40&10 %
Loose Joint.....dis 55&10 %
Loose Joint, Japanned.....dis 55&10 %
Loose Joint, Japanned with Acorns.....dis 55&10 %
Parliament Butts.....dis 55&10 %
Mayer's Hinges.....dis 60&10 %
Loose Pin, no Acorn.....dis 50&10 %
Loose Pin, Acorns.....dis 50&10 %
Loooe Pin, Acorns, Japanned.....dis 60&10 %
Loose Pin, Acorns, Japanned, Plated Tips..dis 60&10 %

WROUGHT IRON.

Fast Joint, Narrow.....dis 50&10 %
Fast Joint, Lt. Narrow.....dis 50&10 %
Fast Joint, Broad.....dis 50&10 %
Loose Joint, Broad.....dis 55&10 %
Table Butts, Back Flaps, &c.....dis 60&10 %
Inside Blind Regular.....dis 50&10 %
Inside Blind, Light.....dis 50&10 %
Loose Pin, Wrt.....dis 55&10 %
Loose Pin, Light.....dis 50&10 %

Spring Hinges:
Geer's Spring and Blank Butts.....dis 33⅓ %
Sabin Mfg. Co.'s Double Acting.....dis 35 %
Union Spiral Spring, Japanned.....dis 25 %
Union Spring Hinge Co.'s.....dis 25 %
American Spring Hinge Co.'s.....dis 30 %
Gem Spring Hinges.....dis 30 %
Barker's Double Acting.....dis 20 %
Union Mfg. Co.....dis 25 %
Bommer's.....dis 25 %
Buckman's.....dis 25 %
Empire.....dis 50&10 %
Acme.....dis 60&10 %
Climax.....dis 50&10 %
Blind Butts Parker.....dis 70&2 %
Blind Butts, Palmer.....dis 45&10 %
Blind Butts, Seymour.....dis 70 %
Blind Butts, Lull & Porter.....dis 70&10 %
Blind Butts, Nicholson.....dis 45&10 %
Blind Butts, Huffer.....dis 40 %
Blind Butts, Clark's, Nos. 1, 3, 5.....dis 70&2 %
Blind Butts, Sargent's, Nos. 1, 3.....dis 66⅔&10 %
Blind Butts, Sargent's, No. 12.....dis 70&10 %
Blind Butts, Reading's Gravity.....dis66⅔&10 %
Blind Butts, Shepard's "Noiseless," Nos. 10, 60, 65, 45 and 55.....dis 70 %
Blind Butts, Sheoard's "Noiseless," Nos. 040 and 060.....dis 70&10 %
Shepard's Lull & Porter Shutter Hinges....dis 70&10 %
Shepard's Reversible Shutter Hinges.....dis 70&10 %
Clark's Improved Shutter Hinge, Nos. 0, 1, 1½, 2, 2½, 3.....dis 60&10 %

Hew Pipe.
Humason, Beckley & Co.'s, Nos. 1 and 2.....dis 60 %
Humason, Beckley & Co.'s other Nos.....dis 66⅔&10 %
Sargent & Co.'s.....$19.70 and $21.40, dis 66⅔&10 %
Hotchkiss.....dis 25 %
Peck, Stow & W. Co.....dis 30&10 %

Butcher's Cleavers.
Humason & Beckley Mfg. Co.....dis 25 %
Bradley's.....dis 25 %
Beatty's.....dis 25&5 %
1 2 3 4 5 6 7 8
$16.50 19.00 21.50 24.00 27.00 30.00 33.50 36.50

Can Openers.
Messenger's Comet.....₩ doz $3.00, dis 25 %
American.....₩ gross $6.00, dis 25 %
Jupiex.....₩ doz 25c. dis 15@20 %
Lyman's.....₩ doz $3.75, dis 20 %
No. 4, French.....₩ doz $2.25, dis 55 %
No. 5, Iron Handle.....₩ gross $9 00, dis 25 %
Eureka.....₩ doz $2.50, dis 10 %
Sardine Scissors.....₩ doz $7.00, dis 55 %
Star.....₩ doz $5.00, dis 25&5 %
Sprague, No. 1, $2.00; No. 2, $2.25; No. 3, $2.50.....dis 50&10 %
"Worlds Best" ₩ gross, No. 1. $12.00; No. 2, $14.00; No. 3, $20.00.....dis 50 & 10 %
Universal.....₩ doz $3.00, dis 35 %
Domestic.....₩ doz $2.50, dis 45 %
Champion.....₩ doz $2.00, dis 50 %

Caps—Percussion, ₩ 1000.
Hicks & Goldmark's
F. L. Waterproof, 1-10's.....50c
E. B. Trimmed Edge, 1-10's.....65c
E. B. Ground Tr'md Edge, Central Fire, 1-10's..70c
Pistol Waterproof, extra heavy, 1-10's.....$1.40
Musket Caps, 1-10's.....80c
} dis 10&5 & 20&10
U. M. C., F. C. trimmed.....50c
U. M. C., F. L. ground.....70c
U. M. C., Cen. fire ground.....70c
U. M. C., Double W. Proof.....$1.40
} dis 10&5 %
G. D. & S. B.....33c, dis 10 %
Double Waterproof, in 1 10's.....$1.40
Colt's Pistol, in 1-10's.....71c
} dis 10 %
F. L.....50c
E. B. 1-10, trimmed.....65c
E. B. 1-10, ground edge.....70c
} dis 10&5 %
Muaket, in 1-10's.....80c, dis 25 %

Cartridges.—Rim.....dis 75&5 %
Central Fire.....dis 45 %

Cards.—Horse and Curry.new list, July, '81,dis 10 %
Cotton.....new list, July, '81, dis 10 %
Wool.....new list, July, '81, dis 10 %

Carpet Stretchers.
Cast Steel, Polished.....₩ doz $4.00. dis 30 %
Cast Iron, Steel Points.....₩ doz $2.00, dis 50&5 %
Socket.....₩ doz $2.50, dis 25 %
Bullard's.....dis 25 %

Casters.—Bed.....dis 45@50 %
Plate.....45@50 %
Shallow Sockes.....dis 35&10 %
Deep Socket.....dis 25&10 %
Martin's Patent (Phœnix).....dis 25 %

Cattle Leaders.
Humason, Beckley & Co.'s.....dis 70&10 %
Sargent's.....dis 70&10 %
Hotchkiss.....dis 25 %
Peck, Stow & W. Co.....dis 33⅓&10 %

Chain.
Trace, 6/4-10-2.....₩ pair 75c
Trace, 6/4-10-3.....₩ pair 70c
Trace, 7-10-2.....₩ pair 80c
} dis 35 %
German Halter Chain, list of Dec. 31, 1881.....dis 50 %
German Coil, list of Dec. 31, 1881.....dis 40 %
Covert Halter, Hitching and Breast.....dis 35&5 %
Oneida Halter Chain (old list).....dis 45 %
Galvanized Pump Chain.....₩ ½ 5½c net
Jack Chain, Iron.....dis 60&10 %
Jack Chain, Brass.....dis 60&10 %

Chalk.
White.....₩ gross 60c net
Red.....₩ gross 80c net
Blue.....₩ gross $1.00 net
White Crayons.....₩ gross 11c net

Chalk Lines.—See Lines

Chisels.
Socket Framing, Crossman.....dis 65&5 %
Socket Framing, Arlington Edge Tool Co....dis 65&10 %
Socket Framing, Buck Bros.....1876 list, dis 22½ %
Socket Framing, Merrill.....dis 65&10 %
Socket Framing, Witherby Tool Co.....dis 65&10 %
Socket Framing, Douglass'.....dis65&10 %
Socket Firmers, Crossman.....dis 65&5 %
Socket Firmers, Arlington Edge Tool Co....dis 65&10 %
Socket Firmers, Buck Bros.....1876 list, dis 22½ %
Socket Firmers, Merrill.....dis 64&10 %
Socket Firmers, Witherby Tool Co.....dis 65&10 %
Socket Firmers, Douglass'.....dis 65&10 %
Socket Corner.....dis 65&10 %
Tanged Firmers.....dis 40@45 %
Tanged Firmers, Butcher's.....$4.00@$4.25 to £
Tanged Firmers, Spear & Jackson's.....5.00 to £
Tanged Firmers ,Buck Bros (Shank).....5.25 to £
Globe Mfg. Co.....dis 65&10 %

Clamps.
Iron, Providence Tool Co.'s Wrt. Iron.....dis 25 %
Iron, Adjustable, Gray's.....dis 20 %
Iron, Adjustable, Lambert's.....dis 20 %
Iron, Adjustable, Snow's.....dis 40&5 %
Iron, Adjustable, Hammer's.....dis 15 %
Iron, Adjustable, Stearns'.....dis 20&10 %
Iron, Cabinet, Sargent's.....dis 20&10 %
Iron, Carriage Makers', Sargent's.....dis 65&10 %

Clips, Axle.
Norway or Best.....dis 60&5 %
Superior.....dis 60&5 %

Cockeyes......dis 55 %

Cocks, Brass.
Racking, new list, July 10, 1880.....
Globe, new list, July 10, 1880.....
Plain Bibbs, new list. July 10, 1880.....
Ale and Beer, new list, July 10, 1880.....
} dis. ...45 %

Coffee Mills.
Board and Box.....dis 45 %
Wilson's.....dis 45 %
Selsor's Flat.....$9.50, $10.50, dis 25 %
American (Enterprise Mfg. Co.).....dis 20&10 %
The "Swift" (Lane Bros.).....dis 20&10 %
Webb's Patent.....dis 45 %

Combined Dinner Pail and Lantern.
Per doz $15.00.....dis 30 %

Compasses, Dividers, &c.
Compasses.....dis 55 %
Calipers.....dis 55 %
Dividers.....dis 55 %
Bemis & Call Co.'s Dividers.....dis 60&5 %
Bemis & Call Co.'s Compasses and Callipers..dis 60&5 %
Bemis & Call Co.'s Wing & inside or outside..dis 60&5 %
Bemis & Call Co.'s Double.....dis 60 %
Bemis & Call Co.'s (Call's Patent Inside).....dis 30 %
Excelsior.....dis 40 %
Cook's Extension.....dis 25 %

Coopers' Tools.
Bradley's.....dis 10 @ 20 %
Barton's.....dis 20 %

Corkscrews.—Humason & Beckly Mfg.Co.dis 33⅓ %
Clough's Pat.....dis 33⅓ %

Corn Knives and Cutters.—Bradley's...dis 10 %
Wadsworths.....dis 25 %

Crow Bars.
Cast Steel.....₩ lb 6½c
Iron, Steel Points.....₩ lb 5 c

Curling Irons, &c.
⅝, ¾, ⅞ in., $1.80, 2.00, 2.40.....dis 10 %
Curling Tongs.....₩ doz $3.65, dis 10 %
Pinching Irons.....₩ doz $7.50, dis 20 %

Curry Combs.
Pitch's.....dis 50&10 %
Hotchkiss, Novelty, new list, July 1880.....dis 25 %
Hotchkiss, Excls. Supr. Champion.....dis 25 %
Rubber.....₩ doz $10.00, dis 25 %

Curtain Pins.
Silvered Glass.....net
White Enamel.....net

Cutlery.
Meriden Cutlery Co. (Table).....net
Am. Miller Bro.'s Cutlery Co.....dis 25 %
Humason & Beckley, Pocket.....dis 33⅓ %
Naugatuck Cutlery Co.....list net
Aaron Burkinshaw's Pocket.....dis 25 %

Dog Collars.
Embossed Gilt.....dis 30&10 %
Leather.....dis 40 %
Brass.....dis 40 %

Door Springs.
Torrey's Rod, regular size, ₩ doz., $3.....dis 50 %
Gray's Rod.....dis 15 %
Bee Rod.....dis 15 %
Warner's.....dis 30 %
Gem (Coil):
No. 1, Large Japanned.....₩ doz $4.00
No 2, Medium, Japanned...₩ doz 2.75
No. 3, Small, Japanned.....₩ doz 2.00
} dis 50 & 10 %
Star (Coil)—For Cop'd, Nickel-Plated &c., see list.
No. 4 ("Shoo Fly") Screen door size, ₩ doz $1.50
No. 5, Screen Door size.....₩ doz 2.00
No. 6, Medium.....₩ doz 2.75
No. 7, Large.....₩ doz 4.00
} dis 60 %
Sabin's Lever...No. 1, $1 12, $1.50; 3, $2; 4, $2.50..dis 35 %
Sabin's Boss. No. 1, ₩ doz. $4.00; 2 $2.75; 3, $2.dis 33⅓ %
Sabin's Crown.....₩ doz $1.50. dis 33⅓ %
Philadelphia.....5 in., $5.00; 8 in., $7.75, dis 35 %
Cowell's.....No. 1, ₩ doz. $18.00; No. 2, $15.00, dis 50 %
Rubber, complete.....₩ doz. $1.80, dis 10 %
Hercules.....dis 50 %

Drawing Knives.
Arlington Edge Tool Co.....dis 65&10 %
Crossman's No. 1.....dis 65&5 %
Morrill.....dis 65&10 %
Nobles Mfg. Co.....dis 15 %
Bradley's.....dis 25 %
Adjustable Handle.....dis 20 %
Witherby Tool Co.....dis 65&10 %
Douglass.....dis 65&10 %
Globe Mfg. Co.....dis 64&10 %

Drills and Drill Stocks.
Blacksmiths'.....each, $2.50, dis 10 %
Blacksmiths' Self-Feeding.....each, $7.50, dis 20 %
Breast, P. S. & W.....dis 20&10 %
Breast, Hotchkiss'.....dis 20 %
Breast, Wilson's.....dis 20 %
Breast, Millers Falls.....each, $3 00, dis 25 %
Breast, Bartholomew's.....each, $2.50, dis 25&10 %
Ratchet, Merrill's.....dis 10 %
Ratchet, Ingersoll's.....dis 25 %
Ratchet, Whitney's.....dis 20 %
Ratchet, Weston's.....dis 20 %
Ratchet, Moore's Triple Action.....dis 20&25 %
Whitney's Hand Drill, Plain, $11.00 Adjustable, $12.00.....dis %
Wilson's Drill Stocks.....dis 10 %
Automatic Boring Tools.....each, $2.25, dis 20 %

Drill Chucks.
Morse's Beach Patent.....dis 30 %
Morse's Adjustable.....each, $10.00, dis 30 %
Danbury.....each, $8.00, dis 30 %

Egg Beaters.
Dover.....₩ doz. $2.50, dis 2 %
Monroe's.....dis 50 %
National.....₩ doz. $4.50, dis 33⅓ %
Standard.....₩ gross, $18.00, dis 25 %
Family (T. & S. Mfg. Co.).....₩ gross, $18.00, net
Acme.....₩ gross, $12.00, dis 25 %
Triumph (T. & S. Mfg. Co.).....₩ gross, $11.50, net

Elevator Buckets.
Mill E. Buckets, light, 3½ to 10 in. (Duc's Improved), ₩ 100, $15 00 @ $45.00.....dis 10 %
Mill E. Buckets, heavy, 5 to 10 in. (Duc's Improved), ₩ doz. $4.50 @ $10.20.....dis 10 %
Storehouse (Duc's Patent), 12 to 17, $12 @ $20....dis 10 %

Emery and Emery Paper.
Regular numbers.....₩ lb 6c
Flour and F. F.....₩ lb 4c
B. & A. Emery Paper.....dis 30&5 %
Sibley's Emery and Crocus Cloth, large size, $10; medium, $7.50 ₩ ream.....dis 15 %

Enameled and Tinned Ware.
Kettles.....dis 50 %
Sauce Pans.....dis 25 %
Tinned Sauce Pans.....dis 25 %

Escutcheon Pins.
Brass.....dis 50 %

Escutcheons.
Door Lock.....Same discounts as Door Locks
Brass Thread.....dis 55 %
Wood.....dis 25 %

Faucets.
Fenn's.....dis 40 %
Bohren's Patent Rubber Ball.....dis 25 %
Fenn's Cork Stops.....dis 33⅓ %
Star.....dis 55&10 %
Frary's Patent Petroleum.....dis 20&10 %
West's Patent Key.....dis 45 %
Ancher Lock.....dis 45 %
Metallic Key, Leather Lined.....dis 50 %
Cork Lined.....dis 70 %
J. Sommer's Best Metallic Key.....dis 40&10 %
J. Sommer's Cork Lined, 1st quality.....dis 50 %
Self-Measuring, Enterprise...₩ doz. $36.00, dis 20&10 %
Self-Measuring, Lane's.....₩ doz. 36.00, dis 20&10 %
Self-Measuring, Victor.....₩ doz. $36.00, dis 20&10 %

Felloe Plates......₩ lb, 10c, dis 25 %

Files.
J. & Riley Carr.....new list April 1, '83, dis 15 %
J & Riley Carr Horse Rasps.....dis 10%
Butcher's.....
Moss & Gamble.....new list, dis 15 %
H. Disston & Sons.....dis 45 %
Nicholson.....dis 45 %
New American.....dis 45 %
Union File Co.....dis 45 %
Heller Bros.' Files.....dis 45 %
Heller Bros.' Horse Rasps.....dis 45 %
Stubs.....new list, dis 25@30 %

Fluting Machines.
Knox, 4¾-inch Rolls.....$3.50 each
Knox, 6-inch Rolls.....$4.00 each
} dis 25 %
Eagle, 3¼ inch Roll.....$2.15, dis 25 %
Eagle, 4¾-inch Roll.....2.85, dis 25 %
Crown, 4¾-in., $3.50; 6-in., $4.00; 8-in., $6.50 each, dis 25 %
Crown Jewel.....6-in., $3.40 each, dis 25 %
American, 4-in., 6¾; 6-in., $5.40; 7-in., $4.50 each, dis 25 %
Domestic Fluter.....$1.50 each, net
Geneva Hand Fluter, White Metal...₩ doz $12, dis 25 %
Crown Hand Fluter, Nos. 1, $15; 2, $12.50; 3, $10.00 ₩ doz.....dis 30 %
Shepard Hand Fluter, No. 85.....per doz $15, dis 40 %
Shepard Hand Fluter, No. 110.....per doz $8.75, dis 30 %
Shepard Hand Fluter, No. 95.....per doz $6.50, dis 20 %
Clark's Hand Fluter.....₩ doz $15.00, dis 33⅓ %
Combined Fluter and Sad Iron....₩ doz $15.00, dis 30 %
Buffalo.....₩ doz $10.00, dis 10 %

Fluting Scissors.....dis 45 %

Fly Traps.
Paragon.....₩ doz., $3, net

Forks.
Hay, Manure and Spading.....dis 40&10 %
Plated, A 1, Rogers & Bro.....dis 40&10&5%
Plated, Reed & Barton.....dis 40&10&5%

Fruit and Jelly Presses.
Enterprise Mfg. Co.....dis 25 %

Fry Pans.
Burnished list as follows.....dis 60&10&5 %
No..... 0 1 2 3 4 5 6 7 8
₩ doz.....$3.00 3.75 4.25 4.75 5.25 6.00 7.00 8.00 9.00
"Acme".....dis 40&10 %

Gauges.
Marking Stanley's.....dis 50&10 %
Marking, Chapin's.....dis 55&10 %
Wire.....dis 10&10 %
Wire, Disston's.....dis 20 %
Wire, Wheeler, Madden & Co.....dis 10 %

Gimlets.
Nail and Spike.....dis 40&10 %
"Eureka" Gimlets.....dis 40&10 %
"Diamond" Gimlets.....dis 40&10 %
Double Cut, Shepardson's.....dis 40&10 %
Double Cut, Hartwell's.....dis 40&10 %
Double Cut, Ives'.....dis 40&10 %
Double Cut, Douglass'.....dis 40 %
"Bee".....₩ gro. $12.00, dis 25 %

Glue Pots.
Tinned and Enameled.....dis 25&5 %
Family, Howe's "Eureka".....dis 25 %
Family, L. F. & C.'s "Handy".....dis 30 %

Grindstone Fixtures.
Sargents Patent.....dis 70&10 %
Reading Hardware Co.....dis 30&10 %

Gun Wads.
U. M. C. B. E., 11 up.....$2.00
U. M. C. B. E., 9&10.....2.30
U. M. C. B. E., 7&8.....2.60
U. M. C. P. E., 11 up.....3.10
U. M. C. P. E., 9&10.....4.00
U. M. C. P. E., 7&8.....4.90
} dis 5&5 %

Halters.
Covert's Pat. Rope.....dis 50 %
Horse and Cattle Ties Covert's.....dis 50 %

Hammers.
Maydole's.....dis 15 %
Cheney's, new list, March, 1883.....dis 20&5 %
Hartford Hammer Co. (new list July 1, '81).....dis 20 %
Humason & Beckley.....dis 15 %
Verree.....dis 5 %
Magnetic Tack, Nos. 1, 2, 3, $1.26, 1.50 and 1.75..dis 25&10 %
Nelson Tool Works.....dis 40&10 %
Warner & Noble's.....dis 5 %
Yerkes & Plumb.....dis 15 %
Wilkinson's Smiths'.....11½c ₩ lb net

Hand Cuffs and Leg Irons.
Providence Tool Co., Hand Cuffs, $15.00 ₩ doz..dis 10 %
Providence Tool Co., Leg Irons, $25.00 ₩ doz....dis 10 %
Tower's.....dis 25 %

Handles.—Door or Thumb Latches.
Nos..... 0 1 2 3 4
Per doz.....$0.50 1.00 1.18 1.35 1.60....dis 60&10 %
Roggin's Latches.....₩ doz 35c. @ 40c. net
Bronze Iron Drop Latches.....₩ doz $0.90 @ 1.20
Jap'd Store Door Handles—Nuts, $1.62; Plate, $1.10; no Plate, $0.88.....dis 10 %
Barn Door.....₩ doz $1.60, dis 10&10 %
Wrought Chest.....dis 70 %
Surface Chest.....dis 60&10 %
Flush Chest.....dis 60&10 %
Lifting.....dis 55&10 %
Saw and Plane.....dis 40&10 %
Boynton's Loop Saw Handles.....50c. dis 35 %
Boynton's Centennial Saw Handles.....50c. dis 35 %
Hammer and Hatchet.....dis 20 %
Hard Awl.....₩ gross, $1.00 dis 10 & 20 %
Hickory Firmer Chisel, assorted, ₩ gross..$4.50
Hickory Firmer Chisel, large, ₩ gross.....5.00
Apple Firmer Chisel, assorted, ₩ gross.....5.00
Apple Firmer Chisel, large, ₩ gross.....6.00
Socket Firmer Chisel, assorted, ₩ gross....3.00
Socket Framing Chisel, assorted, ₩ gross..5.00
File assorted. ₩ gross.....2.75
Auger, assorted, ₩ gross.....5.00
Auger, large, ₩ gross.....7.00
} dis 20&10 @ 25&10
Patent Auger, Ives'.....dis 25 %
Patent Auger, Douglass'.....₩ set $1.25 net
Patent Auger, Swan's.....₩ set $1.00 net

Hangers.
Barn Door, old patterns.....dis 60&10 %
Barn Door, New England.....dis 65&10 %
Climax (Anti-Friction).....dis 50 %
Challenge.....dis 50 %
"Champion" Medina Mfg. Co.....$15; dis 50&10 %
Sterling Improved (Anti Friction).....dis 65&10 %
Cheritree.....dis 50 %
Kidder's.....dis 50&5 %
U. S.....4 in., $12; 5 in., $15; dis 60 %
The "Boss".....dis 50&10 %
Terry's Patent.....4 in., $12; 3½ in., $10; dis 40 %
Cronk.....No. 4, $12; No. 5, $14 40; No. 6, $21; dis 50

Harness Snaps.
Anchor (T. & S. Mfg. Co.).....dis 60 %
Henshaw's, list of 1¾ changed to $14.00.....dis 60 %
Judd's, list of 1¾ changed to $14.00.....dis 55&10 %
Fitch's (Bristol), list of 1¾ change to $14.00...dis 55&10 %
Hotchkiss'.....dis 10 %
Andrews'.....dis 50 %
Sargent's.....dis 70&10 %
German, low list, Sep., 1882.....dis 33⅓ %
German, Sargent's new list.....dis 60&10 %
Covert.....dis 50 %
Covered Spring, new list, Oct., 1882.....dis 60&10 %

Hatchets.
Isaiah Blood.....dis 30 %

Shingling,	Nos. 1 2 3.	₩ doz	$7.25	$8.00 $8.75
Claw,	Nos. 1 2 3.	₩ doz	7.75	8.50 9.25
Lathing,	Nos. 1 2 3.	₩ doz	7.50	8.00 8.50

Hunt's.....dis 25 %

Shingling,	Nos. 1 2 3.	₩ doz	$7.25	$8.00 $8.75
Claw,	Nos. 1 2 3.	₩ doz	7.75	8.50 9.25
Lathing,	Nos. 1 2 3.	₩ doz	7.50	8.25 9.00

Hurd's.....dis 30 %

Shingling,	Nos. 1 2 3.	₩ doz	$8.00	$8.50 $9.00
Claw,	Nos. 1 2 3.	₩ doz	9.00	9.50 10.00
Lathing,	Nos. 1 2 3.	₩ doz	8.00	8.50 9.00

Yerkes & Plumb.....dis 30 %

Shingling,	Nos. 1 2 2.	₩ doz	$8.00	$8.50 $8.50
Claw,	Nos. 1 2 3.	₩ doz	8.25	8.75 9.25
Lathing,	Nos. 1 2 3.	₩ doz	7.50	8.00 8.50

Simmons'.....dis 30 %

Shingling,	Nos. 0 1 2 3.	₩ doz	$7 50	$8.00	$8.50	$9.00	
Claw,	Nos. 0 1 2 3.	₩ doz	....	8.50	9.00	9.50	
Lathing,	Nos. 0 1 2 3.	₩ doz	....	8.00	8.50	9.00	
Broad,	Nos. 1 2 3 4.	₩ doz	9.00	10.00	12.00	14.00	
Broad,	Nos. 5 6 7 8.	₩ doz	16.00	18.00	20.00

Spring.....₩ doz $7.00, dis 50&7½ %
Spring, Leach's Patent.....dis 15 %
Bemis & Call Co.'s Spring and Check.....dis 40 %
Solid, Tinners'.....₩ doz $1.44, dis 40 %

Rail.
R. Sliding,Door, Wrought Brass...₩ ℔ 43c, dis 30 %
Silding Door, Bronzed Wrt. Iron...₩ foot 12c. dis 35 %
Sliding Door Iron, Painted.....₩ foot 4c. dis 10&10 %
Barn Door....Inch..... ⅝ ¾ ⅞
Per 100 feet $2.00 3.00 5.00—dis 10 %
B. D. for N. E. Hangers—
Small. Med. Large.
Per 100 feet.....$2.10 2.70 .30—net
Terry's Wrought Iron, 500 ₩ foot..... .....net

Razors.
J. R. Torrey Razor Co.....dis 15 %

Razor Strops.
Genuine Emerson.....dis 15 %
Badger's Emerson.....dis
Badger's (not Emerson).....dis 33⅓ %
Imitation Emerson.....₩ doz $2.00, dis 20 %
Hunt's.....dis 40&5 %
Chapman.....dis 15 (@ 2) %
Saunder's.....dis 10%
Torrey's.....dis

Rivets.
Iron and Tinned, new list, Dec. 10, 1881.....dis 40 %
In bulk, new list, Dec. 10, 1881.....dis 40 %
Copper Rivets and Burrs.....dis 50 %
Nos.. 7 8 9 10 11 12 13 14 15
₩ ℔.. 49c 50c 52c 54c 56c 58c 60c 65c 70c

Rivet Sets.
.....dis 33⅓&10 %

Rods.
Stair, Brass.....dis 25 %
Stair, Black Walnut.....60c. ₩ doz. dis 10 %

Rollers.
Barn Door, Sargent's list.....dis 6c&10&10 %
Acme (Anti-Friction).....dis 50 %

Rope.
Mnfs' List, July 6, 1883.....dis 10 ₩ ℔
Manila.....½ inch and larger ₩ ℔ 16 c
Manila.....⅜ inch ₩ ℔ 16½c
Manila.....¼ and 5-16 inch ₩ ℔ 17 c
Manila, Tar'd Rope.....₩ ℔ 15½c
Manila, Tar'd Lath Yarn.....₩ ℔ 15½c
Manila, Hay Rope.....₩ ℔ 16 c
Sisal.....½ inch and larger ₩ ℔ 12 c
Sisal.....⅜ inch ₩ ℔ 11½c
Sisal.....¼ and 5-16 inch ₩ ℔ 12 c
Sisal, Hay Rope.....₩ ℔ 11 c

Rules.

	Boxwood.	Ivory.
Chapin's, Standard, Stanley	dis 70&10 %	dis 40@55 %
Stephens	dis 70&10 %	dis 55%

Sad Irons.
From 4 to 10.....₩ ℔ 3½c net
Self-Heating.....₩ doz $9.00 net
Self-Heating, Taflow'.....₩ doz $18.00 net
Gleason's Shield and Toilet.....dis 25 %
Mrs. Pott's Irons, Doubled Pointed.....dis 35 %
Mrs. Pott's Irons, Square Back.....dis 35 %
Enterprise Star Irons, new list, July 20, 1882..dis 35 %
Combined Fluter and Sad Iron....₩ doz $15.00, dis 15 %
Chinese Laundry (N. E. Butt Co.).....8½c, dis 15 %
New England.....40 dis 15 %

Sand Paper.
Baeder & Adamson's Flint, 00 to 1½..$4.50 ₩ ream
Baeder & Adamson's Flint, 2, 2½ & 3. 5.00 ₩ ream
Baeder & Adamson's Flint, Assorted. 4.75 ₩ ream
Baeder & Adamson's Star.....5.75 ₩ ream
Baeder & Adamson's Emery..₩ ream $9.50 @ 11.50
(dis 30&5 %)
Bartles Flint.....$4.75&$5.25 ₩ ream dis 35 %
Bartles Harrison, $4.75 ₩ ream.....dis 35 %
New England, same list as B. & A. Flint.....dis 35 %
Gage's.....dis 30&5%

Sash Cord.
Common.....₩ ℔ 13c net
Patent.....₩ ℔ 15c net
Silver Lake, Hemp.....₩ ℔ 50c, dis 10&5 %
Silver Lake, White Cotton.....₩ ℔ 50c, dis 10&5 %
Silver Lake, Drab Cotton.....₩ ℔ 55c, dis 10&5 %
Raw Hide, ₩ foot, ¼ in., 5c.; 5-16 in., 7c.; ⅜ in., 10c.
.....dis 15 %
Steel Ribbon.....dis 10 %

Sash Locks.
Clark's, No. 1, $10.00; No. 2, $8.00 per gross.....dis 33⅓ %
Ferguson's.....dis 33⅓ %
Walker's.....net
Hammond's Window Springs.....dis 25 %
Northup Window Springs. No. 1, $10.00 ₩ gross..dis 15 %
"Common Sense," Japanned, Coppered and Bronzed.....₩ gross $5.00 net
"Common Sense," Nickel Plated..₩ gross $10 00 net
"Universal".....dis 40 %

Sash Weights.
Solid Eyes, in 400 ℔ lots and over.....₩ ℔ 1¾cnet

Sausage Stuffers or Fillers.
Miles "Challenge".....₩ doz $20, dis 40 %
Perry.....₩ doz, No. 15; No. 0, $21, dis 25&5 %
Draw Cut No. 4.....each $30.00, dis. 20 %
Enterprise Mfg. Co.....dis 20&10 %
Silver's.....dis 25 %

Saws.
Weston's Circular, Mill and Cross Cut.....dis 40 %
Boyington's Lgtn. Panel, Rip, &c.....dis 20 %
Boynton's Circular and Mill...'s new list.....dis 40 %
Boynton's Ice.....dis 40 %
Boynton's Lightning Hand, Panel and Rip.....dis 25 %
Wheeler & Clemson Mfg. Co.'s Hand.....dis 30 %
W. M. & C. Mfg. Co. Cross Cuts.....dis 30 %
Livingston's Butcher and Kitchen.....dis 20 %
Livingston's Framed Wood—
Nos..... 101 102 103 104 105
Per doz.....$10.00 8.50 10.00 7.50 5.20 net
Peace Circular and Mill.....dis 40 %
Peace Hand, Panel and Rip.....dis 25%
Peace Cross Cuts.....dis 35 %
Peace Band Saws, all widths.....dis 10 %
Richardson's Circular.....dis 40 %
Richardson's Mill and X Cut.....dis 40 %
Richardson's Hand Panel Butcher and Web Saws.....dis 25 %

Saw Frames.
White, Vermont.....₩ doz $1.50, dis 25&10%
Red, Polished and Varnished.....₩ doz $1.50, dis 10%
Saw Rods.....$10 list, dis10 & 10%

Saw Sets.
Boynton's Patent X Cut, per doz, $12.00; Hand Saw per doz, $10.00.....dis 25 %
Stillman's Genuine.....₩ doz $3.50 and $4.50 dis 10 %
Stillman's Imitation.....₩ doz $3.25, dis 30&10 %
Common Lever.....₩ doz $2.00, dis 30&10 %
Leach's.....No 0. $8.00; No. 1, $15.00, dis 15 %
Nash's.....dis 20&10 %
Hammer, Hotchkiss.....$5.50, dis 10 %
Hammer, Bemis & Call Co.'s new Patent.....dis 30&5 %
Bemis & Call Co.'s Lever & Spring Hammer..dis 30&5 %
Bemis & Call Co.'s Plate.....dis 10 %
Bemis & Call Co.'s Cross Cut.....dis 12½ %
Aiken's Genuine.....$13.00, dis 50&10 %
Aiken's Imitation.....$7.00, dis 50 %
Hart's Patent Lever.....dis 20 %
Disston's.....dis 20 %
Morrill's.....No. 1, $15 No. 0, $12, dis 40&5 %

Scales.
Hatch, Counter, No. 171.....₩ doz $42, dis 45 %
Hatch, Tea, No 161.....₩ doz $15.00, dis 45 %
Union Platform.....$5.00, dis 45 %
Fairbanks'.....dis 20 %
Richlé Bros.....dis 20 & 10 %
Buffalo Scale Co.....dis 20&5 %
Forsyth Scale Co.....dis 25 %
Howe's.....dis 20&10 %
Chatillon's Grocers'.....dis 40 %
Chatillon's Eureka.....dis 25 %
Family Universal, 12 ℔, $30; 24 ℔. $36.....net
Family Favorite.....dis 30 %
Family, Turnbull's.....dis 30 %
Scale Beams, List of January 12, 1882.....dis 4 &10 %

Scrapers.
Adjustable Box Scraper (S. R. & L. Co.)..$9.50, dis 20&10 %
Box 1 Handle.....₩ doz $4.00, dis 10 %
Box 2 Handle.....₩ doz $6.00, dis 10 %
Defiance Box and Ship.....dis 20&10 %
Foot.....dis 45&10 %
Ship, common.....₩ doz $5.50 net
Ship, Providence Tool Co.....dis 10 %

Screen Corners.
Porter's Pat Window and Door Frame.....dis 33⅓

Screw Drivers.
Douglas Mfg. Co.....dis 20&10&10 %
Disston's.....dis 40 %
Disston's Patent Excelsior.....dis 40 %
Buck Bros.....dis 25 %
Stanley Rule & Level Co.'s, Varnished Hdls..dis 60&10 %
Stanley Rule & Level Co.'s, Black Handles..dis 60&10 %
Sargent & Co.'s.....dis 50&10 %
Gay's Double Action Ratchet
₩ doz, 4 in., $5.00; 5 in., $10.20; 6 in., $12.00—dis 35 %
Mallett & Co.'s Double Action Clutch
₩ doz, 4 in., $7.00; 5 in., $8.00; 6 in., $9.00—dis 15 %
Champion.....dis 25 %
Clark's Patent.....dis 25 %

Screws.
Flat H'd Iron, new list, Dec. 27, 1882.....dis 50&10 %
Round Head Iron, new list, Dec. 27, 1882....dis 45&10 %
Flat Head Brass, new list, Dec. 27, 1882.....dis 50&10 %
Round Head Brass, new list, Dec. 27, 1882...dis 45&10 %
Brass and Silver Capped.....dis 40 %
Japanned, list of Plain Screws.....dis 40&10 %
Coach, Patent Gimlet Point 65&10 % by the Keg, dis 70 %
Coach, Common or Lag.....dis 60&5&10 %
Bed.....dis 10 %
Machine, Flat Head, Iron.....dis 55 %
Machine, Round Head, Iron.....dis 50 %
Bench, Iron.....dis 55&10 %
Bench, Wood, Beech.....₩ doz $2.00, dis 10 %
Bench, Wood, Hickory.....dis 20&10 %
Hand, Wood.....dis 20&10 %
Hand Rail, Sargent's.....dis 60&5&10 %
Hand Rail, Hunnaon, Beckley & Co.'s...dis 66⅔&10 %
Hand Rail, Am. Screw Co., list of Jan. 1, '81.....dis 70 %
Jack (Wilson's).....dis 25 %

Screw Window Balances.
R. R. Hugunin's, No. 1, $2.10; No. 2, $1.75; No. 3 $1.50.....₩ doz net

Scroll Saws.
Lester, $10.00.....dis 25 %
Rogers, $3.50.....dis 25 %

Shears and Scissors.
American (Cast) Iron.....dis 70@70&10 %
Pruning.....see Pruning Hooks and Shears.
Barnard's Lamp Trimmers.....₩ doz $3.75
Tinners'.....add 5 %, dis 10 %
Seymour's, List, Dec., 1881.....dis 60 %
Heinsch's, List, Dec., 1881.....dis 60 %
Heinsch's Tailor's Shears.....dis 33⅓ %
Mass. Cutlery Co. St. Trimmers.....dis 75 %
Wiss, J., & Sons' list, Dec., 1881.....dis 60 %

Sheaves.
Sliding Door, M. W. & Co. list.....dis 45&2 %
Gliding Door, R. & E. list.....dis 60&10&2 %
Gliding Door, Patent Roller.....dis 60&10&2 %
Gliding Door, Patent Roller, Hatfield's....dis 60&10&2 %
Gliding Door, Russell's Anti-Friction.....dis 60&10&2 %
Gliding Door, Moore's Anti-Friction.....dis 60 %
Gliding Shutter, R. & E. list.....dis 50&10&2 %
Gliding Shutter, Sargent's list.....dis 50&10 %
Sliding Shutter, Reading list.....dis 50&10 %
Moore's Anti-Friction (Hanging).....dis 60 %

Shovels and Spades.
Ames, New list, July 1, 1881.....dis 15 %
Griffiths.....dis 40 %
Old Colony.....dis 15 %
Payne Pettebone & Son, new list.....dis 40&10 %
Payne Pettebone & Son, R. R. Shovels.....dis 15 %
Remington's (Lowman's Patent).....dis 30 %
Rowland's.....dis 50&5 %

Shovels and Tongs.
Iron and Brass Head, R. & E. list.....dis 50&10&2 %
Iron and Brass Head, P. S. & W.....dis 50&5&10 %
Polished Steel, new list.....dis50&10&2 %

Slates.
Square Frames, by case.....dis 70 %
Less than a case.....dis 65&10 %

Spoke Shaves.
Defiance Metallic.....dis 20&10 %
Iron.....dis 45 %
Wood.....dis 30 %
Bailey's (Stanley R. & L. Co.), new list.....dis 30&10 %
Stearns'.....dis 30&10 %

Spoke Trimmers.
Bonney's.....₩ doz $10.00, dis 40&5 %
Stearns'.....₩ doz $9.00, dis 20&10 %
Ives'.....No. 1, $15.00; No. 2, $12.00 ₩ doz, dis 15&10 %
Douglass'.....₩ doz $9.00, dis 15 %

Spoons.
Basting.....dis 65&10 %
Riveted Table and Tea.....dis 60&10 %
Solid Table and Tea.....dis 65&10&5 %
Britannia.....dis 60&10 %
Reed & Barton.....dis 40&10&5 %
Holmes, Booth & Haydens.....dis 40&10&5 %
German Silver.....dis 30&10&5 %
Cast Steel, Silver Plated.....dis 33⅓ %
Tin (P. S. & W.), Teas.....$1.25 ₩ gross, net
Tin (P. S. & W.), Tables.....$2.00 ₩ gross, net
Tin (Cowles Hdw. Co.).....dis 10 %
Tin (Cross Hdw Co.), case lots.....dis 20 %

Stocks and Dies.
"Lightning" Screw Plate.....dis 10 %

Stone.
Hindostan No. 1, 6c; Axe, 8c.....dis 40 %
Hindostan Hacker Stone.....₩ gross $12.00 dis 10 %
Sand Stone.....₩ ℔ 6c, dis 33⅓&10 %
Washita Stone.....No. 1, ₩ ℔ 18c net
Washita Stone.....No. 2, ₩ ℔ 16c net
Washita Stone, Slips.....No. 1, ₩ ℔ 37c net
Arkansas Stone No. 1. 4 to 6 in.....₩ ℔ $1.35 net
Arkansas Stone No. 1. 5 to 9 in.....₩ ℔ $2.00 net
Turkey Oil Stone (Chase).....4 to 8 in., ₩ ℔, 60c, dis 10 %
Turkey Slips (Chase).....$1.75 ₩ ℔ dis 10 %
Lake Superior (Chase).....₩ ℔ 16c, dis 10 %
Lake Superior, Slips (Chase).....₩ ℔ 30c, dis 10 %
Grindstones, Family, Loring's.....dis 10 %

Stove Polish.
Joseph Dixon's.....₩ gross $6.00, dis 10 %
Gem.....₩ gross $4.50, dis 10 %
Gold Medal.....₩ gross $6.00, dis 25 %
"Mirror".....₩ gross $6.00, dis 5 %
Lustro.....₩ gross $4.75, net
Ruby.....₩ gross $3.75, net
Rising Sun.....₩ gross $5.75, net
Dixon's Plumbago.....₩ ℔ 8c, net
Boynton's Noon Day ₩ gross No. 1, large, $5.40 No. 2, small, $3; No. 3, medium, $4.

Squares.
Steel.....dis 50 %; full cases, dis 50&10 % } 2% cash
Iron.....dis 50 %; full cases. dis 50&10 % } 2% cash
Nickel Plated.....add $2.50 @ $4.00 ₩ doz, net
Try Square and T Bevels.....dis 50&10 %
Disston's Try Square and T Bevels.....dis 40 %
Winterbottom's Try and Mitre.....dis 20&10 %

Tacks, Brads, &c.
New List, Sept. 1, 1882.
Tinned Swedes Tacks.....dis 30 %
Tinned American Tacks.....dis 30 %
Swedes Tacks, all kinds.....dis 30 %
American Cut Tacks.....dis 30 %
Copper Tacks and Nails.....dis 30 %
Swedes Hungarian Nails.....dis 35 %
Gimp and Lace Tacks.....dis 30 %
Gimp and Lace Tacks, Tinned.....dis 30 %
Finishing Nails.....dis 25 %
Trunk and Clout Nails.....dis 25 %
Common and Patent Brads.....dis 20 %
Basket Nails.....dis 20 %
Brush Tacks.....dis 20 %
Leathered Carpet Tacks.....dis 20 %
Cigar Box Nails.....dis 20 %
Chair Nails.....dis 20 %
Double-pointed Tacks.....dis 40& 5%
Extra 10 % on list.

Tap Borers.
Common and Ring.....dis 20 %
Ives' Tap Borers.....dis 15&10 %
Enterprise Mfg. Co.....dis 20&10 %

Tapes, Measuring.
American.....dis 20 %
Spring.....dis 25&10 %
Chesterman's.....regular list dis 20@25 %

Thermometers.
Tin Case.....dis 75&10 %

Tobacco Cutters.
Enterprise Mfg. Co. (Champion).....dis 20&10 %
Wood Bottom.....₩ doz $10.00, dis 25&10 %
All Iron.....₩ doz $8.25, dis 35 %
Nashua Lock Co.'s.....₩ doz $18.00 dis 50&5 %
Wilson's.....dis 35 %
(Sargent & Co.).....₩ doz $18.00. dis 20 & 10 %
Winsted.....dis 5

Tinners' Tools and Machines.
Machines (P. S. & W.).....list add 20 % } dis 10 %
Tools (P. S. & W.).....add 6 % }

Transom Litters.
Wollensak's Patent.....dis 35 %
Reiher's Patent, new list, Feb., 1882.....dis 20&10&10 %
Excelsior.....dis 50&10&2 %

Traps.
Game, Newhouse.....dis 35 %
Game, Oneida Pattern.....dis 60 %
Game, Blake's Patent.....dis 40&5 %
Mouse, Wood, Choker.....₩ doz holes, 14c
Mouse, Round Wire.....₩ doz $1.50, dis 10 %
Mouse Cage, Wire.....₩ doz $2.50, dis 10 %
Mouse, Catch-em-alive.....₩ doz $2.50, dis 15 %
Mouse, "Bonanza".....per gross $10.00 net
Rat, "Decoy".....₩ doz $10.00, dis 10 %

Trowels.
Lothrops' Brick and Plastering.....dis 25 %
Reed's Brick and Plastering.....dis 15 %
Disston's Brick and Plastering.....dis 20 %
Peace's Plastering.....dis 25 %
Clement & Maynard's.....dis 20 %
Rose's Brick.....dis 15 %
Brades' Brick.....dis 25 %
Worrall's Brick and Plastering.....dis 20 %
Garden.....dis 55 %

Triers.
Butter and Cheese.....dis 25 %

Trucks (Warehouse, &c.
Penfield Block Co.'s list, 1882.....dis 35 %

Vises.
Solid Box.....dis 35 %
Solid "Crown" (A. H. Hildick).....40 to 100 ℔, 150 net
Solid, Peter Wright's.....15@c
Solid, Wilkinson's.....14@15c
Parallel, Parker's.....dis 10 %
Parallel, Wilson's.....dis 35&10 %
Parallel, Howard's.....dis 20&10 %
Parallel, Merrill's.....dis 15 %
Parallel, Sargent's.....dis 60&10 %
Parallel, Backus and Union.....dis 40 %
Parallel, Oval Slide.....dis 40 %
Parallel, Double Screw Leg.....dis 15&10 %
Parallel, Prentiss.....dis 25 %
Parallel, Simpson's Adjustable.....dis 25&5 %
"Family," List.....net
Saw Filers, Bonney's.....₩ doz $24.00, dis 20&10 %
Saw Filers, Stearn's.....dis 20&10 %
Saw Filers, Hopkins'.....₩ doz $17.50, dis 10 %
Saw Filers, Reading.....dis 40&10 %
Cowell Hand Vises.....dis 20 %
Richardson's Vise and Anvil.....dis 25 %

Washer Cutters.
Smith's Patent.....₩ doz $12.00, dis 25 %
Johnson's.....₩ doz $12.00, dis 33⅓ %
Penny's.....₩ doz Pol. $17.50; Jap'd., $16.50, dis
Appleton's.....₩ doz $18.00, dis 50&10 %

Washers.—See Nuts and Washers.

Well Wheels.
.....dis 60&10 %

Wire.
Bras and Copper.....dis 30 %
Market, Bright an Annealed.....dis 55 @ 57½ %
Market, Coppered.....dis 50 @ 52½ %
Market, Galvanized.....dis 45 @ 47½ %
Market, Tinned, Tinned list.....dis 47½ @ 50 %
Stone, Bright and Annealed Nos. 6 to 18..dis 57½ @ 60 %
Stone, Bright and Annealed Nos. 19 to 26 dis 60 @ 62½ %
Stone, Bright and Annealed Nos. 27 to 36..dis 62½ @ 65 %
Stone, Galvanized Nos. 19 to 30.....dis 45 @ 47½ %
Stone, Tinned, Tinned list.....dis 45 @ 47½ %
Tinned Broom Wire.....dis 57½ @ 60 %
Cast Steel Wire.....dis 47½ @ 50 %
Annealed Fence, Nos. 8 & 9.....dis 57½ @ 60 %
Annealed Grape, Nos. 10 to 14.....dis 57½ @ 60 %
Fence Staples.....₩ ℔ 5¾ @ 5¾c
Fence Staples, Galvanized.....₩ ℔ 6¼ @ 6½c
Stubs Steel Wire.....$6.00 to £ dis 30 %
Japanned Barb Fence.....₩ ℔ 6¼c
Galvanized Barb Fence.....₩ ℔ 7¾c
Steel Music Wire, Nos. 7 to 30.....$1.50 ₩ ℔
Picture Wire, T. S. & J.....dis 40 %
Clothes Line Wire, Galvanized.....₩ coil 25 @ 40c net
Wire Cloth, green, drab and black, ₩ sq. ft., 20. @ 25½c.....net

Wrenches.
American Adjustable.....dis 45 %
Baxter's Adjustable "B," list Jan., 1880.....dis 20&5 %
Baxter's Diagonal.....dis 20&5 %
Coes' Genuine.....dis 50&5 %
Coes "Mechanics".....dis 50&10&5 %
Coes' Pattern, Malleable.....dis 75 %
Coes' Pattern Wrought.....dis 50 @ 65 %
Girard Standard.....dis 60 %
Girard Agt.....dis 70 %
Bemis & Call's Patent Combination.....dis 20 %
Bemis & Call's Merrick 's Pattern.....dis 35 %
Bemis & Call's Brigg's Pattern.....dis 25 %
Bemis & Call's Cylinder or Gas Pipe.....dis 40 %
Van Wagoner & Williams' Basin.....₩ doz $4.50
Aiken Pocket (Bright).....$6.00, dis 50&10 %
The Favorite Pocket (Bright).....₩ doz $4, dis 40 %
Webster's Patent Combination.....dis 25 %
Taylor's Farmers'.....dis 25 %

Wringers.

	Per doz.	
Universal, XX, No. 2½	42.00	Lots of 1 doz., dis 33 ⅓ %
Universal, XX, No. 2	45.00	Lots of 2 doz., dis 35 %
Universal, XX, No. 1½	51.00	Lots of 5 doz., dis 40 %
Universal, XX, No. 1	66.00	
Peerless, no Cogs, No. 1	42.00	
Peerless, with Cogs, No. 2½	45.00	
Peerless, with Cogs, No. 2	48.00	
Peerless, with Cogs, No. 3	54.00	
Peerless, with Cogs, No. 4	66.00	
Eureka, No. 2	42.00	
Novelty No. 2, for Common Tubs	$42.00	
Novelty No. 3, for Common Tubs	48.00	
Excelsior No. E, for Stationary Tubs	51.00	
Excelsior No. F, for Stationary Tubs	57.00	
Excelsior No. A, with Folding Bench	60.00	
Excelsior No. B with Folding Bench	66.00	

Henry Disston & Sons,

KEYSTONE SAW, TOOL, STEEL & FILE WORKS,

Front and Laurel Streets,

PHILADELPHIA.

SKEW-BACK SAWS.

D 8

HAND SAW.

This Saw has all the latest improvements in Hand Saws, and is warranted superior to all others, and is giving entire satisfaction.

We call the attention of the trade to our new styles of

COMMON

HAND SAWS,

the *cheapest* in the market.

We are also offering

SUPERIOR

CROSS-CUT

SAWS

FOR THE FALL TRADE.

Send for Price List.

S. H. & E. Y. MOORE,

163 & 165 LAKE ST., CHICAGO,

AGENTS FOR

Rhode Island Tool Co., Chas. W. Pickering & Co., Crown Steel Works
Mansfield Bolt & Nut Co., The Pennsylvania Bolt and Nut Co.
Wm. H. Haskell & Co., Hotchkiss & Upson Co., Black Diamond File Works
Syracuse Bolt Co., Saranac Horse Nail Co., Penfield Block Co.,

MANUFACTURERS OF

BOLTS, NUTS, WASHERS.

Tool Steel,

GIMLET POINT COACH SCREWS, THRESHING MACHINE TEETH,

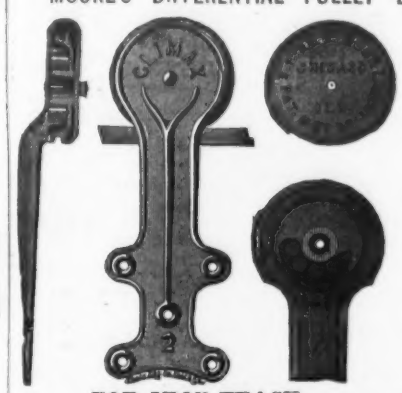
Wood Screws, Files, Horse Nails, Rope and Iron Strapped Blocks, Iron Tackle Blocks, Turn Buckles, Ship Chandler Hardware &c.

ALSO MANUFACTURERS OF

CLIMAX BARN DOOR HANGERS,

BAGGAGE CAR DOOR HANGERS SLIDING DOOR SHEAVES
FREIGHT CAR DOOR ROLLERS AND HANGERS,

MOORE'S DIFFERENTIAL PULLEY BLOCKS, MOORE'S HAND HOISTS, &c.



FOR IRON TRACK.

FOR WOOD TRACK.

The sales of Iron Track "Climax" are larger now than at any time since we began manufacturing them seven years ago. We solicit for them a continuance of the patronage of the trade. We ask attention to our new **Wood Track** "Climax." They are superior to any Wood Track Hanger yet made. Send for Illustrated Price List.

S. H. & E. Y. MOORE, 163 & 165 Lake Street, CHICAGO.

Eastern Agencies for "Climax" Hangers, Differential Blocks, &c., &c.,

HENRY B. NEWHALL CO.,

105 Chambers St., New York. 47 Pearl St., Boston, Mass.

(J. H. WORK, Manager).

SHEPARD'S PATENT HAND FLUTERS.

STOVE LID LIFTERS.

SHEPARD HARDWARE CO.

ESTABLISHED IN 1866 BY JOHN D. SHEPARD.

MANUFACTURERS OF

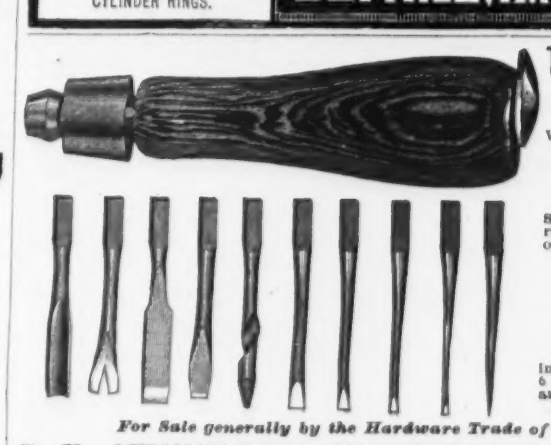
HARDWARE SPECIALTIES.

BUTTLES' PATENT CYLINDER RINGS.

FOUNDRY & FACTORIES
118,120,122,124,126,128,130,132 & 134 CHICAGO ST & 32 & 34 MIAMI ST.

BUFFALO, N.Y.

SHEPARD'S PATENT "NOISELESS" BLIND HINGES.



THE GIANT HOLLOW HANDLE,

WITH TEN USEFUL TOOLS FOR MECHANICS' AND HOUSE-KEEPERS' USE.

This is a half size illustration.

The Tools are made of the best Cast Steel, tempered in oil, and are superior to anything of the kind ever put on the market.

1 SCREW DRIVER,
1 CHISEL,
1 SCRATCH AWL,
1 GIMLET,
1 GOUGE,
4 BRAD AWLS,
1 TACK PULLER,

The Tools are 2¼ inches long and 3-16 inch shank. The Handle is rosewood, 6 inches long, with patent swing top and cam fastening.

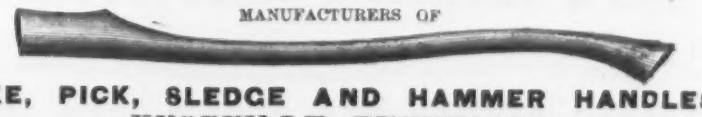
Price, $1 each, postage prepaid.

For Sale generally by the Hardware Trade of the United States,

C. E. JENNINGS & CO., 96 Chambers St., New York.

McCULLOUGH, WOODBURY & CO.,

MANUFACTURERS OF



AXE, PICK, SLEDGE AND HAMMER HANDLES,

KNOXVILLE, TENNESSEE.

ALEXANDER BROS

BEST OAK BELTING

PHILADELPHIA.

Elizabethport Steam Cordage Co.,

MANUFACTURERS OF MANILA, SISAL AND TARRED

CORDAGE OF ALL KINDS.

BINDER TWINE A SPECIALTY.

E. M. FULTON,
D. T. WHITLOCK
A. E. LOKEEN,

46 South Street, New York.

NEW YORK WHOLESALE PRICES, July 11, 1883.

METALS.

IRON.—DUTY: Bars, 8-10c to 1 2-10c ₩ lb; provided that no Bar Iron shall pay a less rate of duty than 35 per cent. Sheet, 1 2-10c ₩ lb to 30 % ad val. Boiler, 1¼c ₩ lb. Band, Hoop and Scroll, 1c to 1 4-10c ₩ lb. Pig, 3-10 of 1c ₩ lb. Wrought and Cast Scrap, 3-10 of 1c ₩ lb. Railroad Bars, weighing more than 25 lb ₩ yard, 7-10 of 1c ₩ lb. Steel Railroad Bars, weighing more than 25 lb ₩ yard, $17 ₩ ton.

American Iron.		
Foundry, No. 1	₩ ton	$22.00 @ 23.00
Foundry, No. 2	₩ ton	19.00 @ 22.00
Gray Forge	₩ ton	18.00 @ 19.00
Scotch Iron.		
Eglinton	₩ ton	21.00 @ 21.50
Carnbroe	₩ ton	22.50 @ 23.00
Coltness	₩ ton	24.00
Shotts	₩ ton	24.00
Glenvarnock	₩ ton	23.00
Gartsherrie	₩ ton	24.00
Langloan	₩ ton	24.00
Summerlee	₩ ton	23.00 @ 23.50
Rails.		
Steel at Eastern mills	₩ ton	38.00
Old Rails 1a		22.00 @ 23.00
Scrap.		
Wrought, ₩ ton from ship and yard		21.50 @ 24.50
Bar Iron from Store.		
Common Iron		
⅜ to 1 in. round and square	₩ lb	2.1c @ 2.20c
1 to 6 in. x ¼ to 1 in.	₩ lb	2.1c @ 2.20c
Refined Iron:		
⅜ to 2 in. round and square	₩ lb	$2.30 @ 2.40c
1 to 6 in. x ⅜ to 1 in.	₩ lb	2.30 @ 2.40c
1 to 6 in. x ¼ and 5-16	₩ lb	2.50 @ 2.60c
Rods—⅝ and 11-16 round and square	₩ lb	2.40 @ 2.50c
Bands—1 to 4 x 9-16 to No. 12	₩ lb	2.70 @ 2.80c
Norway Nail Rods	₩ lb	@ 5¼c

Sheet Iron.

	Common American	R. G. American.
Nos 10 to 16	₩ lb 3.1c @ 3.20c	4¼c
17 to 20	₩ lb 3.2c @ 3.30c	4¼c
21 to 24	₩ lb 3.3c @ 3.40c	4¼c
25 to 26	₩ lb 3.5c @ 4.10c	5 c
27	₩ lb 3.1c @ 4.15c	5 c
28	₩ lb 4.4c @ 4.55c	5¼c

	B. B.	30 qual.
Galvanized, 10 to 20	₩ lb 7¼c	6 c
Galvanized, 21 to 24	₩ lb 7¼c	6¼c
Galvanized, 25 to 26	₩ lb 8¼c	7 c
Galvanized, 27	₩ lb 9 c	7½c
Galvanized, 28	₩ lb 9½c	8 c
Patent Planished	A ₩ lb 10½c	B. 9½c
Russia	₩ lb 13	@ 14c
American Cold Rolled	₩ lb	C @ 7½c

COPPER.—DUTY: Pig, Bar and Ingot, 4c; Old Copper 30 ₩ lb. Manufactured (including all articles of which Copper is a component of chief value), 35 % ad valorem.

American Ingot	₩ lb See Trade Report.

SHEATHING BRAZIERS COPPER, BOLTS, &c.

Braziers' Copper, ordinary sizes, 16 oz. per sq. ft., and over ₩ sq. ft.	26c
Braziers' Copper, ordinary sizes, under 16 oz. and over 12 oz., ₩ sq. ft.	₩ lb 28c
Braziers' Copper, 10 oz. and 12 oz., ₩ sq. ft.	₩ lb 30c
Braziers' Copper, Lighter than 10 oz. ₩ sq. ft.	₩ lb 32c
Circles less than 8½ in. in diameter	₩ lb 29c
Circles 8½ in. diameter and over	₩ lb 31c
Segment and Pattern Sheets	₩ lb 28c
Locomotive Fire Box Sheets	₩ lb 26c
Sheathing Copper, over 12 oz. ₩ sq. ft.	₩ lb 24c
Bolt Copper	₩ lb 26c
Copper Bottoms	₩ lb 31 @ 32c

No Copper in Sheathing except 14x48 inches, and not to exceed 24 oz. to the sq. ft.

TINNING.

Sheets 14 x 48	₩ sheet 8c
All other size sheets, 28c ₩ sq. ft.	

For tinning both sides, double the above amount.

O'NEILL'S PATENT PLANISHED COPPER.—Net.

14x48.

14 and 16 oz. and heavier	₩ lb 37c lb the case. ₩ lb 35c
12 oz. and lighter	₩ lb 40c ₩ lb 39c

Boiler Sizes.

7 in., 14x42. 8 in., 14x48. 9 in., 14x56.

14 and 16 oz. and heavier	₩ lb 39c lb the case. ₩ lb 38c

(And all sizes not over 20 in. wide.)

24x48@30x60.

14 and 16 oz. and heavier	₩ lb 41c
08	₩ lb 44c

SHEATHING METAL.

Yellow Sheathing metal	₩ lb 20 @ 30c

BRASS.

Brown & Sharpe's Gauge the Standard for Metals. Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' PRICE LIST.—dis. 50 %. June 19, 1882.

Cash prices for Roll and Sheet Brass. For less quantities than 100 lbs add 5c. ₩ lb.

HIGH BRASS.

All Nos. not thinner than No. 26, wider than 2 in., not wider than 14 in.	30c
All sizes to No. 28, inclusive, and widths over 14 to 20 in., inclusive	35c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in., inclusive	36c

45c. ₩ lb advance on each No. above Nos. 28 to 36, inclusive.

All Brass thinner than No. 36 is Platers' Brass, at 43c. Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in. 37c

Printers' Rules	45c
Sheets wider than 20 in. and under 40 in.	47c
" 40 in. and over	50c
Circular Sheets, in diam. from 4 in. to 14, inclusive	40c
" over 14 " 20 "	45c
" " 20 " 30 "	49c
" " 30 " 40 "	55c
" " 40 in.	59c

LOW BRASS.

Four cents ₩ lb more than High Brass.

Gilding Metal, 80 ₩ lb more than High Brass.

Platers' or Gold Metal	In Bars	43c
	Sawed	43c
	Planed or Polished	54c

FOR SLITTING.

Metal, in width 1 in. to ¼ in. to No. 26, inclusive, 1c ₩ lb advance.

Metal, in width 2 in. to 1 in thinner than No. 26, 2c ₩ lb advance.

Metal, in width 1 in. to ¼ in thinner than No. 26, 3c ₩ lb advance.

Metal in width ¼ in. to ⅛, inclusive, not thinner than No. 20, 2c ₩ lb advance.

Metal in width ⅛ in. to ⅛ thinner than No. 26, 4c ₩ lb advance.

Metal, ⅛ in. in width and less, 10c ₩ lb advance.

Any of the above widths cut to particular lengths, add 7c ₩ lb.

GERMAN SILVER MARKET METAL AND WIRE.

per cent., 12 inch to No. 26	Market Metal.	Wire
4 " " "	$0.52	$..77
6 " " "	.76	.96
8 " " "	.74	.88
8 " " "	.74	1.03
8 " " "	.87	1.13

German Silver Sheets over 12in. wide and weighing more than 12 lb., 5c ₩ lb.

Advance 2c. for each additional inch in width above 12 in. and 2c. ₩ lb on each No. thinner than Nos. 26 to 2, inclusive.

All German Silver thinner that No. 36 is Platers', at 40c. ₩ lb additional.

German Silver Scrap, one-half less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips, half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Gild'g and Copper.
No. 0 to 20	$0.33	$0.37	$0.48
No. 21	.38	.40	.46
No. 22	.37	.41	.47
No. 23	.38	.42	.48
No. 24	.40	.44	.50
No. 25	.43	.47	.53
No. 26	.45	.49	.55
No. 27	.48	.52	.58
No. 28	.52	.56	.63
No. 29	.55	.59	.66
No. 30	.63	.62	.72
No. 31	.62	.66	.78
No. 32	.66	.70	.84
No. 33	.70	.74	.93
No. 34	.74	.78	1.03

Spring Wire 2c ₩ lb advance.

Flat Square and Half-Round Wire 5c ₩ lb advance on Round Wire.

Fancy Wire not less than 10c ₩ lb advance on Round Wire.

Brass Rods, No. 8 and larger, not less than 2 feet lengths, 18c.

Wire straightened and cut smaller than No. 8 and not less than 2 feet lengths, 15c.

Wire and Rods less than 2 feet lengths, special rates.

Twelve cents per lb extra for spooling on 1 lb spools No 36.

MISCELLANEOUS.

Brass Pull Ears	$0.45
Brass Door Rail	.45

SCRAP.—Net.

High Brass Scrap	12c
Low Brass Scrap	10c
Gilding	16c

Turnings, Filings and Chips sell the price of Scrap.

Terms—Net cash. Interest to be added after thirty days.

TUBING.—dis. 50 %.

	₩ lb
Nos. 10 to 30 inclusive above ¼ in. to 3 in.	$..42
Nos. 1 to 9 inclusive above ¼ in. to 3 in.	.42

Nos. 21, 22, 23, two cents advance on List for each Number.

Nos. 24, 25, 26, four cents advance on List for each Number.

Above No. 26, special rates.

Plain, ¼ inch 7c

Plain, 5-16 inch 1.1c

Plain, ⅜ inch 1.0c

All Mandrel Drawn Tubes, 5 cents advance on List Prices.

Fancy Tubing to No. 22 ..... 4c

English, Scotch and Extra Patterns Fancy Tubing 4 to No. 20 ..... 5c

Tubing sawed or Cut 3 to 4 feet long, 2 cents advance on List.

Add two cents, ¼ cent for each additional cutting under 1 ft.

All Mandrel Drawn Tubes under ¾ in. 25 cents per pound advance.

ZINC TUBING—dis. 25 %.

Plain	27
Fancy	33
Scotch and Extra Patterns	36

GERMAN SILVER TUBING.—dis 25 %.

4 Per cent.	.80
6 Per cent.	.90
9 Per cent.	1.00
12 Per cent.	1.20
15 Per cent.	1.35
16 Per cent.	1.45
18 Per cent.	1.50
20 Per cent.	1.60

STEEL.—DUTY: Ingots, Bars, Sheets, &c., valued at 4c ₩ lb or less, at 45 % ad val. Valued above 4c and not above 7c ₩ lb pays 2c ₩ lb duty; valued above 7c and not above 10c ₩ lb pays 2½c ₩ lb duty; valued above 10c ₩ lb pays 3½c ₩ lb duty. *Extras.* "Steel bars, rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, shall pay ½c ₩ lb in addition to above." Steel Circular Saw Plates shall pay 1c ₩ lb in addition to the above.

American Cast Steel.

For American Steel see quotations under heading of Pittsburgh.

English Steel.

Best Cast	₩ lb 15½c
Extra Cast	₩ lb 16½c
Circular Saw Plates	₩ lb 16c
Round Machinery, Cast	₩ lb 10c
Swaged, Cast	₩ lb 13c
Best Double Shear	₩ lb 14½
Blister, 1st quality	₩ lb 13c
German Steel, Best	₩ lb 11c
2d quality	₩ lb 10c
3d quality	₩ lb 9c
Sheet Cast Steel, 1st quality	₩ lb 15½c
2d quality	₩ lb 14½c
3d quality	₩ lb 21½c

ANTIMONY.....See Trade Report

LEAD.—DUTY: Pig, 2c ₩ 100 lb Old Lead, 2c ₩ lb

Pipe and Sheet, 3c ₩ lb.	
American	4.65 @ 4.70c
Bar	5c
Pipe	6½c, dis 10 %
Tin Lined Pipe	14c, dis 10 %
Sheet	7½c. dis 10 %
Shot	Drop 7c, Buck. 8c
Chilled Shot	8c

BABBITT METAL.

N. P. U	₩ lb 8c
A. 20c; B. 17c; C. 14c.	

TIN.—DUTY: Plates, Sheets, Tagger and Terne, 1c ₩ lb; Bars, Block and Pigs free.

Banca	₩ lb 23½c
Straits	₩ lb 22½c
English	₩ lb 24 c

TIN PLATES.

I C 10x14	Prime Charcoal	$5.25 @ 5.75
I C 14x20	Prime Charcoal	$5.25 @ 5.75
Second quality		$5.87½ @ 6.25
I C 12x12	Prime Charcoal	6.50
I X 10x14	Prime Charcoal	7.75 @ 8.00
I X 14x20	Prime Charcoal	7.75 @ 8.00
Second quality		$7.25 @ 7.00
I X 12x12.	Prime Charcoal	6.25
D C 12½x17.	Prime Charcoal	5.75
D X 12½x17.	Prime Charcoal	7.25
For each additional X add		1.50

COKE TIN PLATE.

	Best.	Ordinary.
I C 10x14	$4.90	$4.15 @ 4.40
I C 14x20		
I C 12x12	4.75	4.40 @ 4.50

TERNE PLATE.

	Prime Char.	2d Qual.	Coke.
I C 14x20	$4.90 @ 5.00	4.25	4.12½
I X 14x20	7.00		
I C 20x28	10.75 @ 11.25	10.50	10.00 @ 10.25
I X 20x28	14.00		
I C 20x200	14.00		
I C 14x20 M. F. Brand			$7.75

SOLDER—½ & ½	15c
Extra	13½c
No. 1	12 c

SPELTER.—DUTY: in Pigs, Bars and Plates, $1.50 ₩ 100 lb.

American, cash	5.00 @ 5.25

ZINC.—DUTY: Pig or Block, $1.50 ₩ 100 lb; Sheet 2½c ₩ lb.

Sheet, Cask	6½ @ 7½c
Sheet, Open	6½ @ 7c

Paper Stock, &c.

(*Dealers Selling Prices.*)

	Cents ₩ lb
White Shirt Cuttings, No. 1	6¼ @ 7
White Shirt Cuttings, No. 2	5¼ @ 5¾
Mill Assorted Whites	4½ @ 5c
Unbleached Muslins	3½ @ 4c
City Whites, No. 1	4½ @ 4¾
New Canton Flannels	2½ @ 3
New Seconds light	3¼ @ 3½
New Seconds dark	2½ @ 3
No. 2 Whites	3½
Cotton Canvas	4½ @ 4¾
Linen Canvas, No. 1	4½ @ 4¾
Seconds, City No. 1	4½ @ 4¾
Seconds, City No. 2	1½ @ 1¾
Colors, per cwt	70 @ 75
Manila Rope	3½
Manila Rope, Tarred	2½ @ 2¾
Gunny Bagging, No. 1	1¾ @ 2
Gunny Bagging, No. 2	1¾ @ 1¾
Kentucky Bagging	4½ @ 4¾
Burlap Bagging, No. 1	2¾ @ 2¾
Tar Shakings	2 @ 2½
Hemp Twine Stock	4½ @ 4¾
Hard White Shavings, No. 1	4 @ 4½
Soft White Shavings, No. 1	3¼ @ 3¾
White Shavings, No. 2, soft	3
Mixed shavings, part white	2½ @ 3
Ledger and Writing	3 @ 3¼
Solid Stock	2½ @ 2¾
Book Stock, No. 1, light	1¾ @ 1¾
Old Newspapers	1½ @ 1¾
Pure Manilas	1¾ @ 2
Bogus Manilas and Hardwares	¾ @ 1
Commons per 100 lbs	60 @ 70
Binders' Board Cuttings	¾ @ 1
Straw Board Cuttings per cwt	75 @ 80

Paints, Oils, &c.

Paints.

Black Lamp, Coach Painters	₩ lb 22 @ 24c
Black Lamp, Ordinary	₩ lb 0c
Black Ivory Drop, fair	12 @ 15c
Black Ivory Drop, best	25c
Black Paint, in oil	kegs 8c; asst'd cans, 11c
Blue Prussian, fair to best	40 @ 55c
Blue Prussian, fair to best, in oil	45 @ 55c
Blue Chinese dry	70c
Blue Ultramarine	18 @ 30c
Brown, Spanish	1½c
Brown, Van Dyke	10 @ 12c
Green, Chrome	15 @ 25c
Green, Chrome, in oil	14 @ 25c
Green, Paris	good, 20c; best, 25c
Green, Paris, in oil	good, 30c; best, 45c
Iron Paint, Bright Red	₩ lb 2½c
Iron Paint, Brown	₩ lb 1½c
Iron Paint, Purple	₩ lb 3 c
Iron Paint, Ground in oil, Bright Red	₩ lb 6½c
Iron Paint, Ground in oil, Red	₩ lb 4½c
Iron Paint, Ground in oil, Brown	₩ lb 5½c
Iron Paint, Ground in oil, Purple	₩ lb 6 c
Mineral Paints	2 @ 4c
Orange Mineral	18c
Red Lead, American	7c
Red Venetian (Eng.) dry	$1.6c @ $1.7c
Red Venetian, in oil	asst'd cans, 11c; kegs, 8c
Red Indian dry	9 @ 12c
Rose Pink	10 @ 12c
Sienna, American, Raw, powdered	8c
Sienna, Burnt, powdered	15c
Sienna, Burnt, in oil	10 @ 15 @ 20c
Sienna, Raw	11 @ 14 @ 20c
Umber, Burnt, powdered	4 @ 8.
Umber, Burnt, in oil	9 @ 12 @ 15c
Umber Raw, powdered	3½ @ 7½c
Umber, Raw, in oil	10 @ 15 @ 20c
Vermilion, Chinese	90c
Vermilion, English	45 @ 48c
Vermilion American, Common	15c
White Lead, American, pure dry	6½ @ 6¾c
White Lead, American, pure in oil	6½ @ 7c
White, Paris, English, prime	in bbls. 2 @ 2½ c
Yellow Ochre, French	$1.75
Yellow Ochre, French, in oil	asst'd cans, 11c; kegs, 8c
Yellow Ochre, Vermont	in casks, 1½c
Yellow Chrome	17 @ 27c
Yellow Chrome, in oil	14 @ 18 @ 24c
Zinc White, American No. 1, dry	5 @ 6c
Zinc White, American No. 1, in oil	9c
Zinc White, French (Paris) dry	8 @ 10c
Zinc White, French, in oil	10 @ 11c

Oils.

Linseed Raw, in casts and bbls	65c @ 67c
Linseed Boiled, in casks and bbls	69c @ 70c
Linseed, Calcutta	58c @ 59c
Bleached Whale	₩ gal 65c
Bleached Sperm	₩ gal $1.35
Bleached Elephant	72c
Signal	60c
Frame Lard	75c
No. 1 Extra	72c
West Virginia	85c @ 1.05
Drilling	40c
Miners' Oil	44c @ 47c
Fish Oil, pressed	43c @ 45c
Neatsfoot	75 @ 80c
Tallow	7c @ 7½c
Empire Cylinder Oil	44c
Machinery	40c
Engine	30c

Sundries.

Asphaltum Cuban	8c @ 8c
Asphaltum Egyptian	8c @ 9c
Benzine	₩ gal 9c @ 11c
Chalk	1½c
Chalk, Block	1½c
Dryers Patent Am'n	ass't cans, 9c; kegs 7c
Flostings	4c
Glue, White	24 @ 35c
Glue, Sheet	20c
Glaziers' Points, Zinc	4c
Gum, Copal	38c
Gum, Damar	30c
Gum Shellac, English	40c
Gum Shellac, English, dark	35c
Litharge	7½c
Mineral Wool, ordinary	₩ lb 1 @ 1½c
Mineral Wool, extra	₩ lb 3 @ 3½c
Pumice Stone, selected Lumps	4 @ 5c
Pumice Stone, Powdered	3½c
Pine Tar, Bbls	$2.75
Pitch	$1.90
Putty, in bladders	3c
Putty, in bulk	2½c
Rosin—Common and Good—Strained	$1.90
E & F	$2.10 @ $2.20
G & H	$2.30 @ $2.50
I & K	$2.60 @ $2.80
M & N	$3.00 @ $3.25
Spirits Turpentine	37 @ 38c
Whiting Spanish	75c
Waste, No. 1 Cop	10c
Waste, No. 1 White Machine	10c
Waste, No. 2 White Machine	9½c
Waste, No. 1 Colored	7c
Waste, No. 2 Colored	6½c
Waste Washed Machine	6c

Glass.

Prices current per box of 50 feet.
List, July 2, 1883.

Single.

SIZES.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$13.50	$11.50	$10.75	$10.25
11 x 14 to 16 x 24	14.50	13.50	12.50	11.50
18 x 22 to 20 x 30	16.50	17.00	15.50	14.00
15 x 36 to 24 x 30	20.50	18.50	16 25	
26 x 28 to 24 x 36	22.00	20.50	17 50	
26 x 36 to 26 x 44	24.00	22.00	18.50	
26 x 46 to 30 x 50	26 00	24.00	20.50	
30 x 42 to 30 x 54	27.00	25.00	21.50	
30 x 56 to 34 x 56	29.00	27.00	24.00	
34 x 58 to 34 x 60	31.00	29.00	26.00	
36 x 60 to 40 x 60	35.00	31.00	29.00	

Double.

SIZES.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$17.50	$15.00	$14.00	$13.00
11 x 14 to 16 x 24	20.00	18 00	16 50	
18 x 22 to 20 x 30	24.00	22 00	20.00	
15 x 36 to 24 x 30	26.50	24.00	21.0 /	
26 x 28 to 24 x 36	29.00	26.00	23 00	
26 x 36 to 26 x 44	30 00	28.00	24.00	
26 x 46 to 30 x 50	33.00	31.00	27.00	
30 x 42 to 30 x 54	35 00	32.00	28.00	
30 x 56 to 34 x 56	37.00	34.00	30.00	
34 x 58 to 34 x 60	40.00	37.00	33.00	
36 x 60 to 40 x 60	43 00	40.00	37.00	

Sizes above—$15 per box extra for every 5 inches.

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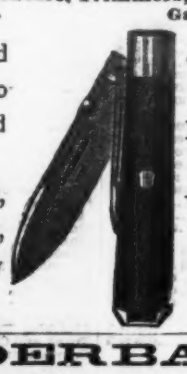

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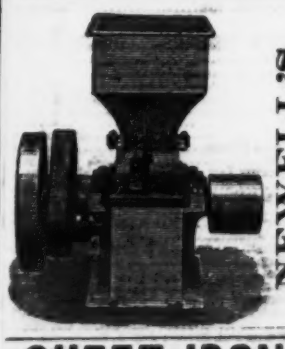

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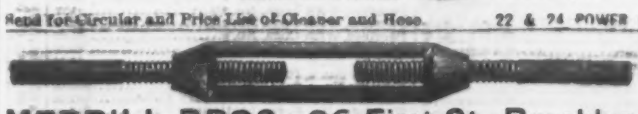

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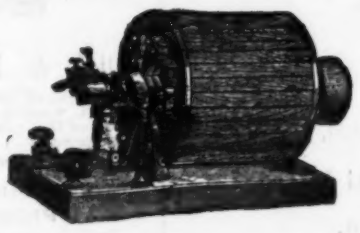

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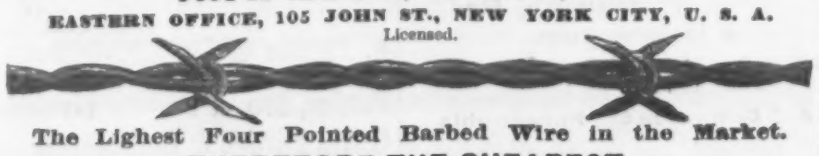

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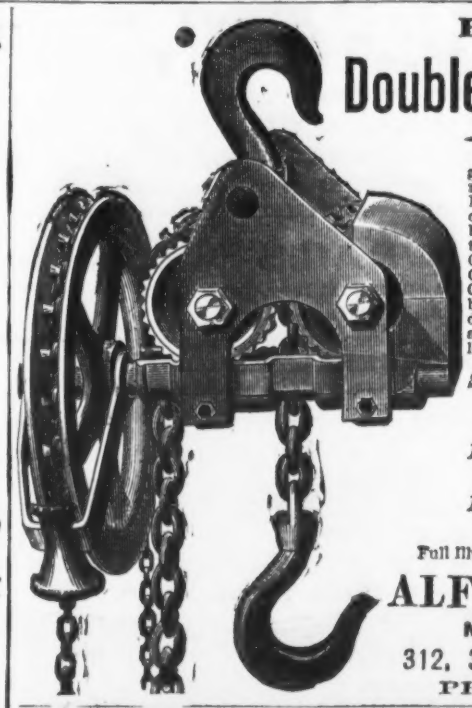

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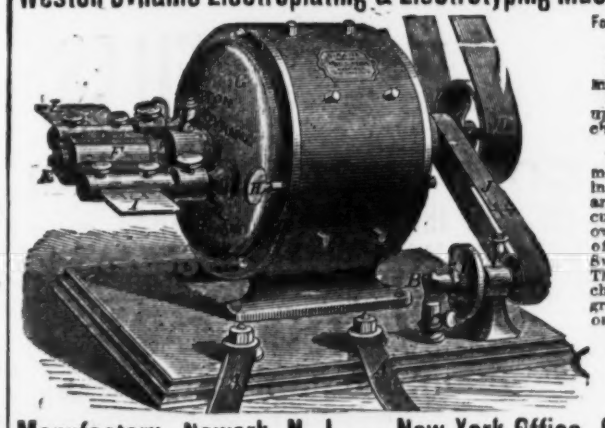

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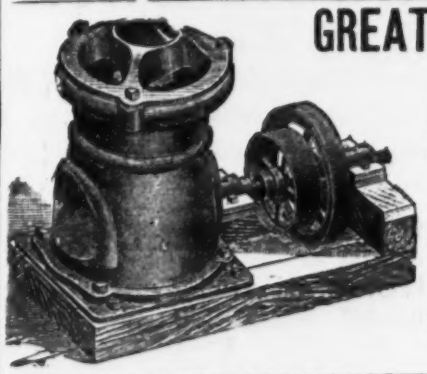

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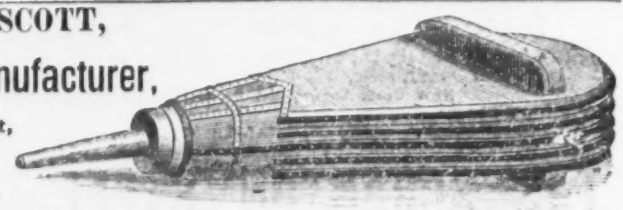

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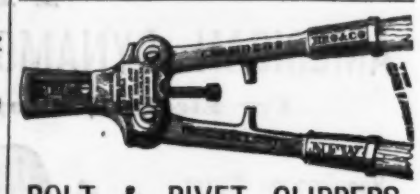

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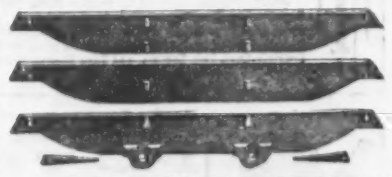

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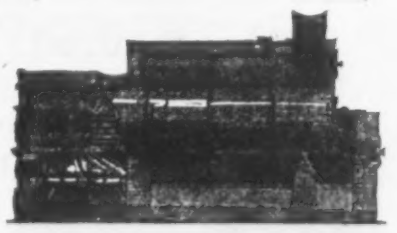

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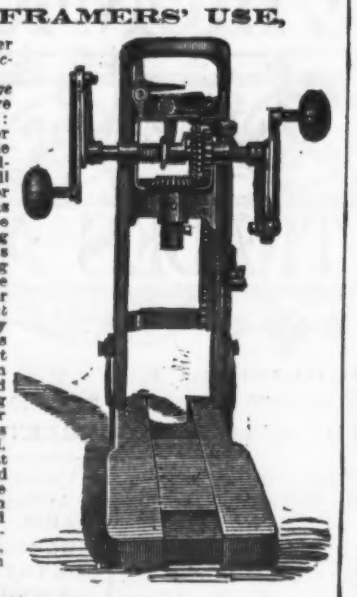

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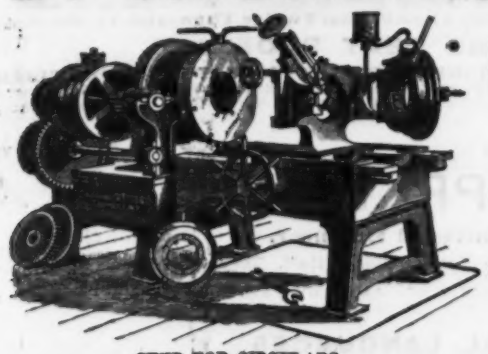

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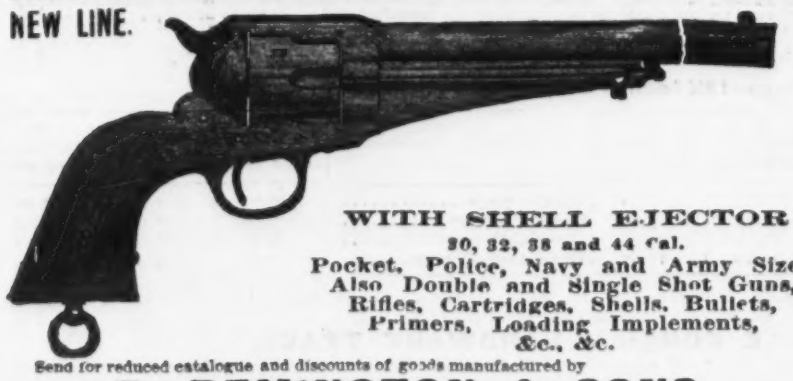

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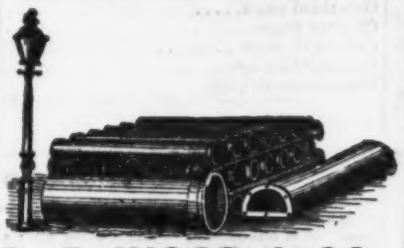

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It will throw a continuous jet FROM FORTY TO SIXTY FEET. A new pattern jet and spray nozzle is sent with each pump.

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Very Respectfully,

THE AMERICAN BOLT & SCREW CASE CO.

MORSE TWIST DRILL AND MACHINE CO.

NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,

Beach's Patent Self-Centering Chuck, Solid and Shell Reamers,

BIT STOCK DRILLS,

DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL PRESSES. BEACH'S PATENT SELF-CENTERING CHUCKS, CENTER AND ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS. DRILL GRINDING MACHINES. TAPER REAMERS, MILLING CUTTERS AND SPECIAL TOOLS TO ORDER.

All Tools exact to Whitworth Standard Gauges.

GEO. R. STETSON, Supt. EDWARD S. TABER, Treas.

BEECHER & PECK

Successors to Milo Peck, Manufacturers of

PECKS DROP PRESS

PECK'S DROP LIFTER is the only one which has its parts cushioned. Being thus cushioned they are the most durable Lifter in the market.

Can be attached to any drop now in use.

Send for Illustrated Catalogue.

Cor. Lloyd and River Sts. **New Haven, Conn.**

MATTHIESSEN & HEGELER ZINC COMPANY,

LA SALLE, ILLINOIS,

MANUFACTURERS OF

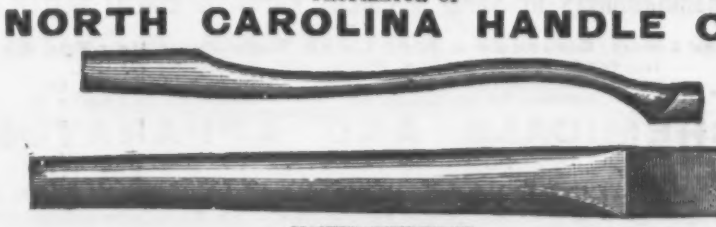
Refined Spelter, Sheet Zinc and Sulphuric Acid.

ALL ORDERS FILLED PROMPTLY.

V. G. HUNDLEY,

PROPRIETOR OF

NORTH CAROLINA HANDLE CO.



MANUFACTURER OF

Handles and Spokes,

79 Reade Street and 97 Chambers Street, - - - - NEW YORK.

HARDWARE COMMISSION MERCHANT.

PHILADELPHIA.

Corrected Weekly by Lloyd, Supplee & Walton.

Terms, 30 days. For 60 or 90 days, interest added at 10% per cent. per annum.

Anvils.
Peter Wrights, ₩ ℔ ..... 11 @ 11½c
Over 200 lbs. 11½c
Trenton 10½c
Eagle Anvils, American, 100 ..... dis 30 %

Apple Parers.
Globe Apple Pearers ..... $5.00 net
Penn Apple Parers ..... $6.00 net
Lots of 10 to 24 dozen special prices.
Bay State Peach Parer $9.00

Axes.
Hunt's Kentucky and Yankee, per doz ..... $8.50 @ 9.00
Robert Mann ..... $8.00 @ 8.50
Richland Chief ..... $7.50 @ 8.00
Beveled Axes ..... " add 500 net
Double Bit Axes ..... net " $14.40 @ 14.50

Augers and Auger Bits.—New List January 7, 1880.
Bates' Nut Augers ..... dis 40&10 %
Cook's Augers ..... dis 40&10 %
Watrous' Ship Augers ..... dis 15 %
Benjamin Pierce Auger Bits ..... dis 40 %
Griswold Auger Bits ..... " dis 45&10 %
Cook's " ..... " dis 40&10 %
Jennings' " ..... dis 10, 10&10 %
Bonney's Pat. Hol. Augers, list $48 ₩ doz. dis 24&10 %
Stearns' Pat. Hol. Augers, list $48 ₩ doz. dis 20&10 %

Balances.
Light and Common ..... dis 14&10 %

Bells.
Bevin Bros. Mfg. Co. Light Hand Bells ..... dis 70 %
Swiss Pattern Hand Bells ..... low list dis 40&10 %
Connell's Door Bells ..... dis 15 & 10
Gt. Western & Kentucky Cow new list ..... dis 60

Boring Machines
Upright, without Augers ..... List 5.50 } dis 45@50 %
Angular, without Augers ..... " 6.75 }

Bolts.—Eastern Carriage Bolts ..... dis 80 @ 80 & 10 %
Philadelphia " ..... new list dis 70&10 %
Stanley, Wrought Shutter ..... dis 50&10 %

Braces.—Barber's ..... dis 40&5 %
Backus ..... dis 50 %
Spofford ..... dis 40&5 %
American Ball ..... dis 45 %

Butts.—Cast Fast Joint, Narrow ..... dis 45&10 %
" " Broad ..... dis 45&10 %
Cast Loose Joint, Narrow ..... dis 55&10 %
" " Broad ..... dis 45&10 %
" Acorn, Loose Pin ..... dis 50&10 %
" " Jap'd ..... dis 60&10 %
" Mayer's Loose Joint ..... dis 60&10 %
Wrought Loose Pin ..... dis 55&10 %
" Table Hinges and Back Flaps ..... dis 40&10 %
" Narrow, Fast ..... dis 50&10 %
" Loose Joint ..... dis 45&10 %

Blind Butts.
Parker ..... dis 70 & 2 %
Clark ..... dis 70 & 2 %
Shepard ..... dis 70 %
Lull & Porter ..... dis 70&10 %
Huffer's ..... dis 50 %

Chains.—German Halter and Coil, list December 81, 1881 ..... dis 45@ 40 %
Galvanised Pump ..... ₩ ℔ 9½c net
Best Proof Coil Chain—English.

₩ ℔	13	10	8½	⅝	¾	⅞	gold
	9-16	¼	5-16	⅜	7-16	½	in.

Chisels.—Socket Framing ..... dis 60&10 %
Socket Firmer ..... dis 60&10 %
Butcher's ..... $4.00 to 8 gold

Casters.—Bed (new list July 1, 1880) ..... dis 40@50 %
Plate ..... dis 40@40 %

Coffee Mills.—Box and Side, new list Jan. 1, 1880 ..... dis 45 %
Enterprise ..... dis 25 %

Cutlery.—Widen Pocket ..... new list net
Penna. Knife Co. ..... new list net
Landers, Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.

Drawing Knives.
Hart Mfg. Co.'s ..... dis 60&10 %
Adjustable Handle ..... dis 20 %

Fry Pans.
Tinned ..... dis 45 %

₩ doz.	$3.40	4.00	4.50	5.00	5.50	6.50	7.50	9.00	10.00
No.	0	1	2	3	4	5	6	7	8

Burnished ..... dis 60, 10 & 5 %

₩ doz.	$3.00	3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00
No.	0	1	2	3	4	5	6	7	8

Files.
Nicholson ..... dis 40 %
Disston ..... dis 50 %
Butcher ..... "

Fluting Machines.
Eagle—3/4 in. roll ..... each, $2.15 } dis 25 %
" 1¼ in. roll ..... " 2.85 }
Crown—¾ in. roll ..... " 3.80 }
" —5 in. roll ..... " 4.00 } dis 25 %
" —8 in. roll ..... " 4.50 }
Geneva Fluter ..... dis 25 %
Favorite com. Fluter & Sad Iron ..... ₩ doz $10.50 net

Hammers.
Yerkes & Plumb's, new list ..... dis 30 %
Maydole Hammers ..... dis 15 %
Howell A. E. Nail Hammers, ... per doz. net $3.75

Handles.
Disston Loop Handles Crosscut ..... 330 pair net
Boynton Loop Handles Crosscut ..... 130 pair net

Hatchets.
Yerkes & Plumb, new list ..... dis 30 %
Hunt ..... dis 25 %

Hinges.
Strap and T ..... dis 55 & 10 %

Horse Nails.

Nos.	5	6	7	8	9	10	
Globe	24	21	19	18	17	16	dis 12½ %
Vulcan	30	25	21	20	19	18	dis 12½ %
Auxable	30	27	25	24	23	22	dis 20&10 %

" Polished and P't'd & Glued & P't'd..31 28 26 25 24 23 dis 20&10%
Clinton ..... 21 21 20 19 18 dis 40&10%
" Polished & Pointed..24 22 21 20 19 dis 20&10%

Hay and Straw Knives.
Lightning ..... per doz, net $18.00
Electric ..... " " 18.00
Wadsworth ..... " " 10.50
Walton Straw Knives ..... " " 17.00

Locks and Knobs.
Branford ..... new list dis 45, 10& 2 % cash
Gaylord Cabinet ..... dis 25&2 % cash
American Padlocks ..... dis 30, 10&2 % cash
Scandinavian Padlocks ..... dis 50 %

₩ doz.	$4.00	5.50	6.50	7.50	8.50	10.00	12.50	} dis 50 %
No.	57	58	59	60	61	62	63	
₩ doz.			$12.00		16.00		23.00	} dis 60 %
No.			64		65		66	

Lanterns.
Buckeye ..... Large list net; small list net
Tubular ..... No. 0, $8.65; No. 1, $10.15 ₩ doz net
Guards, 35 cents extra per doz. net.

Lawn Mowers.—Pennsylvania ..... } new list
Philadelphia ..... } dis 30 %
Excelsior ..... }

Lawn and Garden Pumps.
Roland Patent ..... List $5.00 dis 10 %

Mattocks.
Long and Short Cutter ..... new list ..... 45 %
Pennsylvania Pattern ..... dis 4 %

Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets ..... dis 25 %
Stebbins' Gates ..... dis 70&10%
Lincoln's " ..... dis 60&10 %
Landers, Frary & Clark's Petroleum ..... dis 20&10 %
Brass Liquor Cocks, new list Jan. 1 1880 ..... dis 45 %
Cork Lined " ..... dis 70 %

Meat Cutters.
Dixon's ..... dis 25&5 %
Woodruff ..... dis 25&5 %
Stowe ..... dis 25&5 %
Hale's ..... new list, dis 40, 10&2 cash
American ..... dis 25 %
Stuffers ..... dis 25&5 %
Enterprise Stuffers ..... dis 25 %

Planes.—Sandusky Tool Co. ..... dis 20 %
Ogonts ..... dis 25 %
Ohio & Auburn ..... dis 20 %
Bailey (S. R. & L. Co.) ..... dis 20&10 %

Plane Irons.—Ohio Tool Co. ..... dis. 20 %
Butcher's $5.00

Plumbers and Jewels.
Stanley's Adjustable ..... dis 60&10 %
" Non-Adjustable ..... dis 50&10 %

Picks.—New list ..... 40 %

Razor Strops.
Lamont Combination ..... per doz. $4.00
" " ..... 1 gross lots $42.00
Imitation Emerson ..... per doz. 2.00

Rules.—Stanley Boxwood ..... dis 70 &10 %
Stanley Ivory ..... dis 50&10 %

Steelyards.—Hart's Pattern ..... dis 33⅓&10 %

₩ doz.	$14.00	17.75	21 00	26.50	31 00	35.00
Lbs	50	100	150	200	250	300

American Pattern ..... dis 33⅓&10 %

₩ doz.	$8.00	10.25	13.75	14.50	16.75	19.50
Lbs	50	100	150	200	250	300

Squares.
Steel and Iron ..... dis 40; full case, dis 40&10&2 for cash
Try squares, Stanley ..... dis 60&10 %
Disston's Try Squares ..... dis 40 %

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened ..... ₩ doz $9.00
Clipper No. 10, Bronzed Blade, Boxed and Sharpened ..... ₩ doz $8.50 } 50
Clipper No. 5, Painted Red, Boxed and Sharpened ..... ₩ doz $8.00
Saws.—Disston's Hand, Panel and Rip ..... dis 20 %
Disston's Circular ..... dis 40 %
Cross-Cut No. 2, Plain Tooth ..... dis 40%
" Patent Tooth ..... dis 40%
" Champion Tooth ..... dis 40%
Boynton's Lightning Cross Cut, new list ..... dis 40 %
" Lightning Buck Saws, cross bar ..... dis 40 %

Shovels and Spades.
Oliver Ames & Sons, new list ..... dis 15 %
Griffiths ..... dis 40@40&5
Rowland ..... dis 50@40&5

Sad Irons.—4 to 10 lbs ..... ₩ ℔ 3½c
Mrs. Potts' Patent ..... dis 35 %

Screws.
Wahlita Extra ..... ₩ ℔ 28c net
" No. 1 ..... " 23c
" No. 2 ..... " 19c
" Slips ..... " 17c
" Axe ..... " 13c net
Hindostan Oil Stone No. 1 ..... ₩ ℔ 6c } dis 33⅓ %
" Axe Stone ..... " 8c }
" Slips ..... " 10c }

Screws.
Flat Head Iron, new list Dec. 27 ..... dis 40 & 10 %
Flat Head Brass, new list Dec. 27 ..... dis 40 & 10 %
Round Head Brass, new list Dec. 27 ..... dis. 40 & 10 %
Round Head Iron, new list Dec. 27 ..... dis. 45 & 10 %

Spoons.
Plated ..... dis 40, 10 & 5 %
German Silver ..... dis 30 & 10 %
Britannia, Boardman's ..... dis 60 %
" Parker's ..... dis 60&10 %

Tinned ..... dis 10 %

Springs.—Torrey ..... dis 40 %
Gem No. 3 small Jap'd ..... $2.00 } dis 50 & 10 %
" No. 2 medium Jap'd ..... 2.75 }
Coil No. 70 per gross net $6.00
Other Standard Springs ..... dis 60&10 %
Warner Door Springs, per doz. net 1.75
Standard Spring Hinges—
Single No. 0, per doz. net 1.25
" No. 1, " " 1.00
Other Standard Spring Hinges ..... dis 20&10 %

Stocks and Dies. ..... dis 10&5 %

Stove Polish.—Gem ..... ₩ gross, $1.50, dis 5 %
Dixon ..... 6.00, dis 10%
Fire Fly ..... $3.00 gross net

Tacks. ..... dis 30&10 %
Shoe Nails—4-8, and over 8c ..... } 10 %
" " 3½-8, and under 9c ..... }
Double Pointed Tacks ..... dis 50&5 %

Traps.
Genuine Oneida—Newhouse ..... dis 15 %
Im. Oneida—Newhouse list, first qual dis 15&5 @ 60 %
Improved—Solid Box Trenton new list ..... dis 15 %

Wrenches.—Agricultural ..... dis 70 %
Coes' Genuine ..... dis. 50&3 %
Coes' Mechanics' ..... dis. 50&10&3 %
" " Mail. Bar ..... dis 75 %

Wire.
Bright or Ann'd, No. 0 to 18 ..... dis 53½ to 55 %
" No. 19 to 26 ..... dis 60 to 62½ %
" " No. 27 to 36 ..... dis 65 to 67½ %
Coppered, 0 to 18 ..... dis 47½ to 50 %
Tinned Broom Wire ..... dis 55 to 57½ %
Galvanized Barb Wire 90c
Painted Barb Wire 80c
Galvanized No. 7 to 12 ..... Market List, dis 42½ to 45 %

Wringers.
Peerless No. 2½ $42.00
" No. 2 ..... 45.00
Universal No. 2½ 42.00
" No. 2 ..... 45.00
Novelty No. 2, for common tubs 42.00
" No. 3 ..... 48.00
Excelsior E, for stationary tubs 51.00
" F " " 57.00

In lots of 1 doz. $3.00 doz. dis. from above price.

PITTSBURGH.

Merchant Iron.

TERMS.—Note or acceptance at 60 days, with current rate of exchange on New York, or a discount of 2 per cent. for cash, if remitted within 10 days from date of invoice.

For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.

The following are card rates.

Flat Bar.

1½ to 4 by ⅝ to 1 inch 2.50
1½ to 6 by ⅜ to 1 " 2.60
1½ to 6 by ⅛ to 1¼ " 2.90
1¼ and 1½ by ⅜ to 1¼ " 2.60
1 and 1¼ by ⅜ to 1¼ " 2.70
⅝, ¾ and ⅞ by ⅛ to ⅝ inch 2.80

Rounds and Squares.

1 to 1¼ ..... 2.40 | ⅝ to 9-16 ..... 2.70
1 to 2⅛ ..... 2.70 | ½ to 7-16 ..... 2.90
2⅛ to 3¼ ..... 3.00 | ⅜ 3.10
3⅛ to 4 ..... 3.50 | 5-16 ..... 3.30
4⅛ to 6 ..... 4.00 | ¼ 3.50
⅞ to ⅛ ..... 2.90 | 9-16 ..... 5.50

Ovals Iron.

⅛ to 1¼ ..... 2.90 | ⅛ 3.30
⅛ to ⅝ ..... 3.10 | ¼ 3.70

Half Oval and Half Round.

⅛ to 1¼ inch ..... 3.20 | ⅛ inch 4.00
⅛ to ⅝ " ..... 3.70 | ¼ " 5.50

Horse Shoe.

⅜ to 1¼ by 5-16 to ⅝ inch 3.40

Wagon Box Iron.

⅛ inch, Nos. 13 and 14 ..... 3.70
⅛ " " 11 and 12 ..... 3.40
⅛ " " 13 and 14 ..... 1.90
⅛ " " 11 and 13 ..... 3.80
⅛ " " 13 and 14 ..... 4.40
⅛ " " 11 and 12 ..... 4.10

Heavy Bands.

¾ to 6 by ⅛ and 5-16 inch 2.70
1⅛ to 3¼ by ⅛ and 5-16 " 2.70
1 to 1¼ by ⅛ and 5-16 " 2.80
⅜ to ⅞ by ⅛ and 5-16 " 1.00
⅜ and ⅝ by ⅛ and 9-16 " 3.50

Light Bands.

1¼ to 6 by ⅛ to 3-16 ..... 3.00
1¼ to 6 by Nos. 11 and 12 ..... 3.10
1 to 1⅛ by ⅛ to 3-16 ..... 3.10
1 to 1¼ by Nos. 11 and 12 ..... 3.20
⅛ and 13-16 by ⅛ to 3-16 ..... 3.40
⅛ and 13-16 by Nos. 11 and 12 ..... 3.50
⅛ and 11-16 by ⅛ to 3-16 ..... 3.70
⅛ and 11-16 by Nos. 11 and 12 ..... 3.80
⅛ and 9-16 by ⅛ to 3 16 ..... 4.00
⅛ and 9-16 by Nos. 11 and 12 ..... 4.10
⅝ inch by ⅛ and 9-16 ..... 4.30
⅝ inch by Nos 11 and 12 ..... 4.40

Hoop Iron.

1¼ to 4, Nos. 13, 14 and 15 ..... 3.30
1¼ to 2, Nos. 16, 17 and 18 ..... 3.40
1¼ to2, No. 19 ..... 3.50
1¼ to 2, No. 20 ..... 3.60
1¼ to 2, No. 21 ..... 3.70
1¼ to 2, No. 22 ..... 3.80
15-16 to 1, and 1⅛, Nos. 13, 14 and 15 ..... 3.50
15-16, 1, and 1⅛, Nos. 16, 17 and 18 ..... 3.60
15-16, 1, and 1⅛, Nos. 19 and 20 ..... 3.70
15-16, 1, and 1⅛, No. 21 ..... 3.80
15-16, 1, and 1⅛, No. 22 ..... 3.90
⅞, Nos. 13, 14 and 15 ..... 3.70
⅞, Nos. 16, 17 and 18 ..... 3.80
⅞, Nos. 19 and 20 ..... 3.90
⅞, No. 21 ..... 4.00
⅞, No. 22 ..... 4.10
13-16, Nos. 13, 14 and 15 ..... 3.90
13-16, Nos. 16, 17 and 18 ..... 4.00
13-16, No. 19 and 20 ..... 4.10
13-16, No. 21 ..... 4.20
13-16, No. 22 ..... 4.30
¾, Nos. 13, 14 and 15 ..... 4.30
¾, Nos. 16, 17 and 18 ..... 4.40
¾, Nos. 19 and 20 ..... 4.50
¾, No. 21 ..... 4.60
¾, No. 22 ..... 4.70
11-16, Nos. 13, 14 and 15 ..... 4.50
11-16, Nos. 16, 17 and 18 ..... 4.60
11-16, Nos. 19 and 20 ..... 4.70
11-16, No. 21 ..... 4.80
11-16, No. 22 ..... 4.90
⅝, Nos. 13, 14 and 15 ..... 4.70
⅝, Nos. 16, 17 and 18 ..... 4.80
⅝, Nos. 19 and 20 ..... 4.90
⅝, No. 21 ..... 5.00
⅝, No. 22 ..... 5.10
9-16, Nos. 13, 14 and 15 ..... 4.90
9-16, Nos. 16, 17 and 18 ..... 5.00
9-16, Nos. 19 and 20 ..... 5.10
9-16, No. 21 ..... 5.20
9-16, No. 22 ..... 5.30
9-16, No. 23 ..... 5.40
⅝ inch, Nos. 13, 14 and 15 ..... 5.10
" Nos. 16, 17 and 18 ..... 5.20
" Nos. 19 and 20 ..... 5.30
" No. 21 ..... 5.40
" No. 22 ..... 5.50
" No. 23 ..... 5.60

The prices under Hoop Iron do not apply to Cotton Ties.

1-100 per lb. extra will be charged for each gauge lighter than the lightest indicated.

1-10c per lb. extra will be charged for cutting Hoops to specified lengths.

Barrel Hoops.

1¼ to 2 in., cut to length.

9 to 11 lbs. per set of 6 hoops 3.50
8 lbs. and less than 9 lbs. per set of 6 hoops 3.60
Less than 1bs. per set of 6 hoops 3.80

Extras for Cutting to Length all Preceding Iron.

All Iron, including Tire 1.100

Tank Iron.

No. 9 and heavier 3.30
Plow Slabs 3.50
" Wings 3.40

Sheet Iron.

	Common.	Charcoal.	Juniata.
No. 10 to 14	3.40	4.00	5.00
No. 15 to 17	3.80	4.30	5.80
No. 18 to 21	4.10	4.60	7.10
No. 22 to 24	4.30	4.80	7.30
No. 25 & 26	4.40	5.00	7.40
No. 27	4.70	5.30	7.70
No. 28	5.10	5.60	8.10

All sheet-iron No. 18 and lighter, over 30 inches wide, not less than 2.10c extra.

Wood's Patent Planished Sheet.

1st quality (A) ..... 10½c | 2d quality (B) ..... 9 c

Galvanized C. H. B.—(Charcoal Hammered Blooms.

Nos. 14 to 20	12c	No. 27	15c
Nos. 21 to 24	13c	No. 28	16c
Nos. 25 and 26	14c	No. 29	18c

40½ @ 45 % discount.

Coal Screen Iron.

1¼ by ⅝ by 4-16 ..... 3.00 | 1 by ⅝ by 4-16 ..... 3.50

Angle Iron.

1½, 2, 2½ and inch 3.30
1½, 1¾ 2 and 2½ inch 3.30
1¼ inch 3.40
1 " 3.40
1¼ by 1 inch, for Plow Handles 3.80
1¼ by ⅝ " " " 3.80
1¼ by ¼ " " " 3.90

T Rail.

8 lbs. to the yard ..... 2.50 | 20 lbs. to the yard 2.80
12 " " ..... 2.50 | 25 " " 2.80
16 " " ..... 2.80 | 30 " " 2.80

Splice Joints for 12, 16 and 20-lb. Rail, 40c each; 25 and 30 lb. Rail, 50c. each: 40 lb., 60c each.
3½ by ⅝ and ¾ Spikes for 20 and 25-lb. Rail 4½c
3½ and 3 by ⅝ " " 12 and 16-lb. " 4½c
2¾ by 5 16 " " 8 lb. Rail 5½c

Flat Rods.—Punched and Countersunk.

1¼ to 2 by ¼ to ⅝ inch 3.00
1¼ by ⅝ and 7-16 inch 3.20
1¼ by ½, 7-16 and ⅜ inch 3.50

Nails.

See Pittsburgh Trade Report.

Best Quality Refined Cast Steel.

Square, Flat, Octagon and Round.

⅜ to 2 inches, inclusive 11c
1-16 and 2⅛ to 3 inches 12c
¼ and 3⅛ to 4 " 13c
7-32 and 4⅛ to 5 " 14c
3-16 and 5⅛ to 6 " 17c
5-32 inch 22c
⅛ inch 30c
Oil Well Steel Forrings 30c

Machinery Steel.

	Crucible.	Bessemer & Open Hearth
Ordinary Sizes, ⅜ to 2 inch Round	7c	6c
5-16 and 2⅛ to 3 inches	8c	6c
¼ and 3⅛ to 6 "	9c	7c
7-32 inch	11c	8c
5-16 "	12c	10c

Square, Flat and Octagon, ½c extra throughout the list.
Cut to specified lengths, ½c extra.

Hammer Cast Steel.

Crucible Cast Steel 8½c
Open Hearth Cast Steel 7c

Sheet Steel.—Crucible.

	Best.	2d Qual.	3d Qual.	Bessemer & Open Hearth.
To 21 gauge	12c	11c	9c	7c

1c. extra for each additional gauge.
Cut to multiples or specified lengths, ½c. extra.

Miscellaneous Cast Steel.

Auger and Auger Bit 8½c
Axle Steel for carriages and wagons 8½c
Frog Points and Plates 10c
" Side Bars 8½c
Pick, plain (hammered) 10c
" and Mattock, beveled (rolled) 8½c
Skate Steel 9c
Table Cutlery, plain 7c
Table Cutlery, beveled 7½c
Pike and Cant Hook 8½c
Coal and Granite Wedge 8½c
Roller 8½c
Spindle, subject to Machinery classification 8½c
Tap Spring Steel 10c
Forged Crank Pins and Lathe Spindles 11c
Piston Rods, plain 8½c
" forged to shapes 12c
Slide Bars, plain 8½c
" forged to shapes 11c

Crucible, Open Hearth or Bessemer

Boiler, Fire-Box and Flue Sheets, not less than 3/16 thick 6½c
Boiler, Fire-Box and Flue Sheets, not less than 5/16 thick 7½c
Circulars and semi-circulars, when ordered separately 8c
Smoke Stack, to shape 8c
Locomotive Tank Steel 7

File Cast Steel.

Square, Round, Half Round and Flat Bastard, 8-inch and over 8c
Mill Saw, 8-inch and over 8½c
Taper, 3/16-inch and over 8½c
Horse and Shoe Rasp 8½c

Spring Cast Steel.

Spiral and Taper, cut to lengths 7c

Tire Cast Steel.

1X½ and over 3½c
1X3-16, ⅞X3-16 and ¾ 4c
1 and 1¼-10X¼ and 5-32, ¾X3-16 and 5-32 ..... 4½c
¾ and ⅞X⅛ and 3-32 and 12 g 4½c
Solid Safe Cast Steel 7½c
Three and Five Ply Cast Steel 10c

Agricultural Implement Cast Steel.

Fork and Rake, Crucible 8c
Horse Rake Steel, cut to lengths, Crucible 8c
Hoe, Crucible 7½c
Corn Stalk Cutter, beveled 7½c
Beveled Hoe and Shovel Steel in Bars 6½c
Crucible Plow Steel in slabs 6½c

Bessemer and Open Hearth.

Spring 4½c
" spiral and taper, cut to lengths 5½c
Tire, 5-16 thick and above 4½c
Toe Calk 4½c
Plow 4½c
Axle Billets 4½c
Sleigh Shoe 3c
Cutter Shoe, cut to lengths and tapered 4c
Scythe Back Steel 5½c
Grain Drill Bars 4½c
" Points 8½c
Rolling Coulter Blanks, cut and punched 9½c
Thrasher Steel 4½c
" Teeth 4½c
Rolled Hammer Billets 4½c

Terms.—Four months; 2 per cent. discount for cash, if remitted within 30 days.

Rolls and Castings.

Furnace Floor and Straightening Plates ..... 2 c
Housings and Castings not otherwise specified ..... 3 c
Guide Plates 3½c
Spindles and sounding boxes ..... 3 c
Sand Rolls and Pinions, large size ..... 3 c
" small size 3½c
Pipe Mill Castings 2½c
Rolling Mill Castings under 40 lbs ..... 3 c
Spur and Bevel Wheels, large ..... 4 c
" small 4½c
Pulleys up to 30 inches 4½c
" over 30 inches 4½c
Engine Castings, light 4½c
" heavy ..... 4 c

Chilled Rolls.

6 to 10 in. diam. to 20 in. long 8c
8 to 14 in. " 8 to 40 in. " 8c
24 to 24 in. " 18 to 72 in. " 4½c
14 to 21 in. 72 to 108 in. " 4½c

After Oct. 1, 1881, no discounts will be made at settlement as heretofore, prices quoted being net.

White and Red Lead.

Strictly Pure White Lead in Oil, in Kegs, 6½c.; in 25 ℔ Tin Pails, 7c. ₩ ℔ over keg price; 12½ ℔ Tin Pails, 1c ₩ ℔ over keg price; assorted, 1 to 5 ℔ cans, 50. per ℔ over keg price.
Dry White Lead in barrels 6½c
Red Lead, very brilliant, in kegs, 6½c; in barrels 6½c
Litharge (Potter's Lead) " 6½c; 6½c

Freights equalized with all points where White Lead is made.

Terms: Note at sixty days, or if paid within 15 days from date of invoice a discount of 2½ per cent. will be allowed, but not otherwise.

Window Glass.

Discount, 70 % on Single Strength, 70 & 10 % on Double.

Single Strength.

Size.	AA.	A.	B.	C.
5 x 8 to 10 x 15	$8.25	$7.50	$7.00	$6.50
11 x 14 to 16 x 24	9.25	8.50	8.00	7.25
18x 22 to 20 x 30	10.75	9.75	9.75	7.75
14 x 36 to 24 x 36	13.25	12.75	9.00	8.50
26 x 28 to 24 x 36	13.00	11.50	9.75	9.00
26 x 36 to 26 x 44	14.50	13.25	10.75	9.50
26 x 40 to 30 x 50	15.00	14.00	11.25	10.50
30 x 42 to 30 x 54	16.00	14.50	12.00	
30 x 46 to 34 x 58	17.25	15.50	13.50	
34 x 42 to 34 x 60	18.25	17.25	15.00	
36 x 60 to 40 x 60	20.75	18.75	17.25	

Double Strength.

6 x 8 to 10 x 15	13.75	11.75	10.75	10.00
11 x 14 to 16 x 24	14.50	13.25	12.50	11.25
18 x 22 to 20 x 30	17.25	15.75	14.00	
14 x 36 to 24 x 30	19.75	17.25	14.50	
26 x 28 to 24 x 36	21.00	18.50	15.75	
26 x 36 to 26 x 44	23.25	21.25	17.25	
26 x 46 to 30 x 50	24.00	22.40	18.00	
30 x 52 to 30 x 64	25.75	23.25	19.25	
30 x 60 to 34 x 56	27.75	25.00	21.75	
34 x 58 to 34 x 60	29.25	27.75	24.00	
36 x 60 to 40 x 60	33.25	30.00	27.75	

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 42 inches in length and not making more than 84 united inches, will be charged in the 84 united inches bracket.

Hubbard, Bakewell & Co.'s Goods.

Axes, Single Bit, Lippincott ..... Per doz. $8.00
" " James & Co ..... " 7.00
" Double Bit, Lippincott ..... " 14.00
" " James & Co ..... " 12.00
Drain Tools, list ..... dis 20%
Hoes, Planters' ..... dis 50%
" Scovill Pattern ..... dis 55%
" Handled, Square Eye, German ..... dis 35%
Handles, Cross Cut ..... Per doz. $3.50
" Shovel, Bent, Bored, Riveted ..... " 2.50
Saws, Circular ..... dis 40%
" Long ..... dis 40%
" Cross Cut, H. B. & Co., Champion. Per ft. net $0.35
" Cross Cut, Lippincott, Champion. Per ft. net ..... .30
Shovels, list ..... dis 20%
Spades, " ..... dis 20%
Scoops, " ..... dis 20%

THE MILLER CO.

CANTON, OHIO,

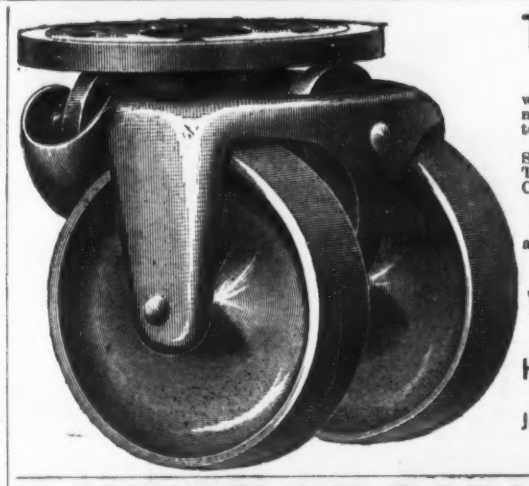
Manufacturers of the

Ohio Farm, Church, School and Factory BELLS.

Also very superior strong, soft and clean CASTINGS. If you have failed to get difficult pieces elsewhere give us a trial.

SOLE MANUFACTURERS OF THE

Torrent and Unique Steam Pumps.



THE YALE CASTER.

A New Caster,

with at least ten distinct improvements over anything of the kind heretofore made.

For Furniture of all kinds, Flower Stands, Pianos, Stove and Warehouse Trucks, and anything that needs a Caster.

Ten Sizes.

Six of the largest sizes now ready and four more sizes will follow soon.

Send for Circular.

YALE CASTER CO.,

New Haven, Conn.

HENRY B. NEWHALL CO.,

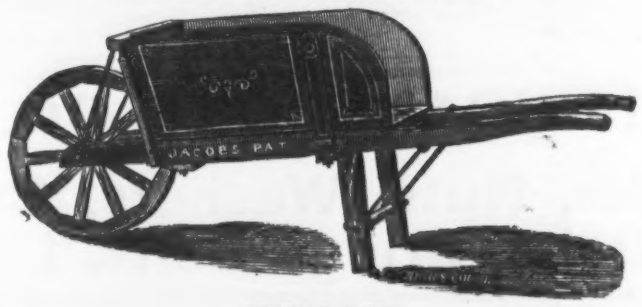
103 Chambers St., New York.

John Duer & Sons, Baltimore, Md., AGENTS.

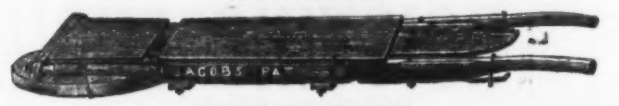
See *Iron Age* editorial, March 22.

GARDEN OR FARM BARROW

With Jacobs' Patent Wheel.



SET UP FOR USE.



FOLDED FOR SHIPPING.

These Barrows are made with double frames, bolted together, iron braced, and so constructed that by removing one bolt (the axle) and two nuts, can be folded flat down (see cut), and shipped at lowest rate of freight. But a moment's time is required to set up for use.

We also manufacture a full line of

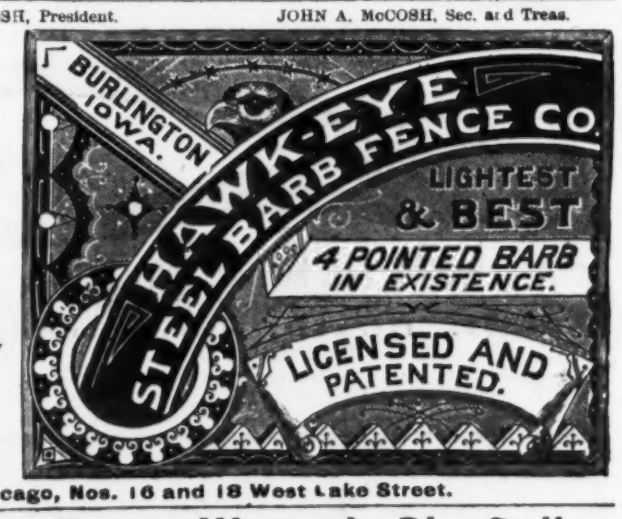
RAILROAD, ORE, BRICK and STONE BARROWS. Also,

Road Scrapers, Road Plows, Levelers, &c.

KILBOURNE & JACOBS MFG. CO.,

COLUMBUS, - - - - - - - OHIO, U. S. A.

THOMPSON McCOSH, President. JOHN A. McCOSH, Sec. and Treas.



Chicago, Nos. 16 and 18 West Lake Street.

The Medart Patent Wrought Rim Pulley

THE LIGHTEST, STRONGEST, BEST BALANCED, AND CHEAPEST IN THE WORLD.

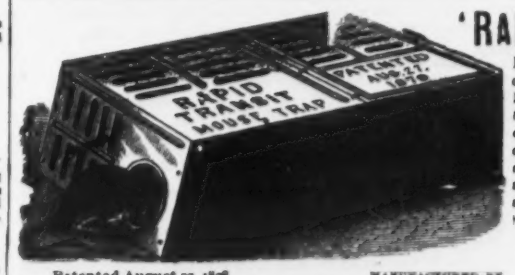
We make Whole Pulleys from 9 inches to 90 inches diameter, and Split Pulleys from 12 inches to 72 inches diameter. All widths of face up to 32 inches crowning and up to 36 inches straight: also tight and loose and Double Arms.

Absolute Satisfaction Guaranteed.

SEND FOR PRICE LIST.

MEDART PAT. PULLEY CO., 1206 to 1214 N. Main St., St Louis, Mo.

THE 'RAPID TRANSIT' TRAP



Has no superior, and is a sure and certain catcher of Mice. With the Metal Platform resting on wood bottom of Trap, an invitation is always extended to Mice of whatever "kind, color or condition of race," into secure and grated quarters, from which they are released by opening cover of Trap and depositing contents into a pail of water.

The Mice go in at a rapid rate,
And each one sets it for his mate.

Patented August 27, 1878. MANUFACTURED BY

THE SMITH & EGGE MANUFACTURING CO., Bridgeport, Conn.

Agents FLAGER FORSYTH & BRADLEY 298 Broadway New York.

CARRIAGE, WAGON,

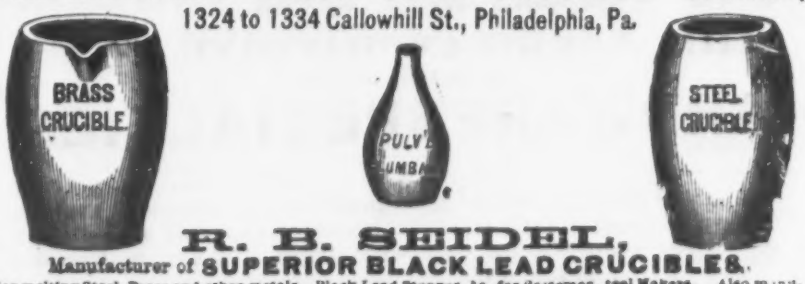
CANTON SPRING CO.

CANTON OHIO.

AND SEAT SPRINGS.

PHILADELPHIA BLACK LEAD CRUCIBLE WORKS,

1324 to 1334 Callowhill St., Philadelphia, Pa.

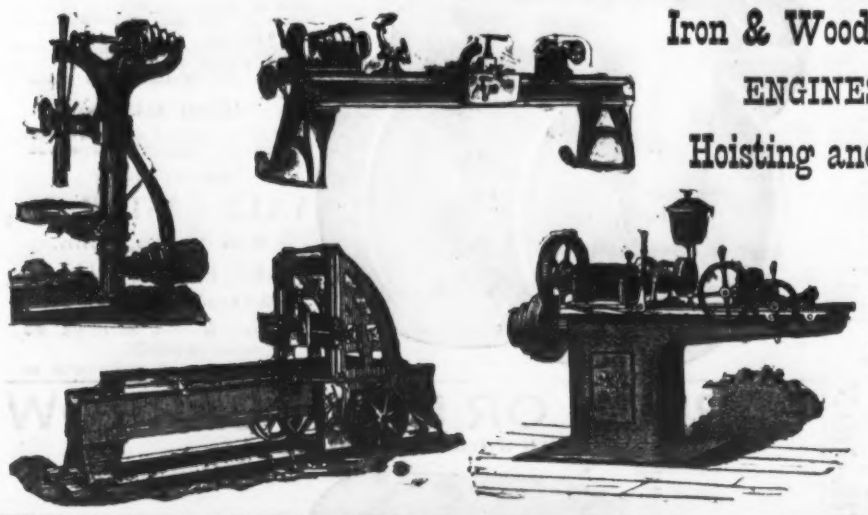


R. B. SEIDEL,

Manufacturer of SUPERIOR BLACK LEAD CRUCIBLES.

For melting Steel, Brass and other metals. Black Lead Stopper, &c., for Bessemer Steel Makers. Also manufacturer of superior quality Hammered Charcoal Iron of different sizes and

L. M. RUMSEY MANUFACTURING CO.,
ST. LOUIS, MO.



Iron & Wood Working Machinery,

ENGINES AND BOILERS,

Hoisting and Pumping Engines.

MACHINISTS' TOOLS.

Lathes, Planers, Shapers, Drill Presses, Gear Cutters, Bolt Cutters, Milling Machines.

CHUCKS—Lathe, Planer and Drill.

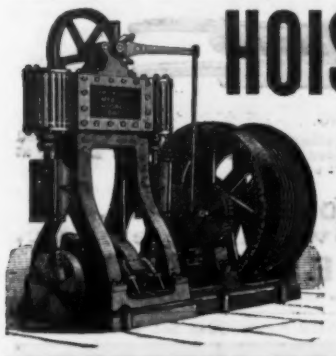
SLIDE RESTS.

Pipe Threading & Tapping Machines.

SUPPLIES—Machinists', Foundry, Blacksmiths', Wagon Makers', Plumbers', Steam and Gas Fitters', Water and Gas Works, Miners', Contractors' and Mill.

CANTON TOOL STEEL.

AMERICAN BOLT CO., Lowell, Mass.,
MANUFACTURERS OF
Bolts, Nuts, Washers, Chain Links, Car Bolts, Bridge Bolts, Lag Screws, &c.



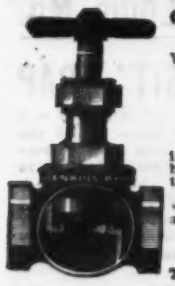
HOISTING ENGINES
FOR
Blast Furnaces, Coal and Iron Mines.

CRANE BROS.' MFG. CO.

CHICAGO WORKS:
No. 10 N. Jefferson Street.
NEW YORK OFFICE:
92 & 94 Liberty Street.

BLAIR'S PAT. HOG and PIG RINGERS.
No. 148,656. Date, March 17, 1874.
E. BLAIR, Manufacturer,
BUCYRUS, OHIO.
Beware of Infringers who are offering imitations and will come to grief.

JENKINS PATENT VALVES.
GATE, GLOBE, ANGLE, CHECK AND SAFETY.



Manufactured of Best Steam Metal.

We claim the following advantages over all other Valves and Gauze Cocks now in use

1.—A perfectly tight Valve under any and all pressures of steam, oils or gases.
2.—Sand or Grit of any kind will not injure the seat.
3.—You do not have to take them off to repair them.
4.—They can be repaired by any mechanic in a few minutes.
5.—The elasticity of the Disc allows it to adapt itself to an imperfect surface.

In Valves having ground or metal seats, should sand or grit get upon the seat it is impossible to make them tight except by regrinding, which is expensive if done by hand, and if done by machine soon wears out the valve, and in most cases they have to be disconnected from the pipes, often costing more than a new valve.

The Jenkins Disc used in these Valves is manufactured under our 1880 Patent and will stand 200 lbs. steam. Sample orders solicited. All Valves sold by us are warranted and are stamped.

JENKINS BROS.,
71 John Street, New York. 79 Kilby Street, Boston.

We are now prepared to make all kinds of

STEEL CASTINGS
FROM
OPEN HEARTH METAL.

We wish to give special attention to making **Cast Steel Rolls** of all sizes, **Mill Gearing** wherever Cast Steel is suitable. Also **Cranks, Cross Heads, Shafts,** &c., for Steam and Blowing Engine construction.

Being desirous of securing a share of public patronage, we will endeavor to make our product equal in quality to any in the market.

MACKINTOSH, HEMPHILL & CO., Limited,
PITTSBURGH, PA.

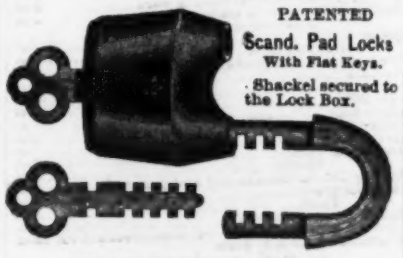
THE AMERICAN MACHINE CO.,
MANUFACTURERS OF
HARDWARE SPECIALTIES.
Office and Factory
Lehigh Ave. and American St., Philadelphia.
Branch House:
No. 128 Chambers St., New York.

SPECIALTIES: Fluting Machines, Hand Fluters, Plaiting Machines, Christmas Tree Holders, Bickford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, Ice Cream Freezers and Cake Mixing Machines.

STAR LOCK WORKS.
ESTABLISHED 1836.

Trunk Locks, Pad Locks, Dead Latches, Door Springs, Trunk Stays, Keys, &c,

110 South 8th St., and Sansom, bet. 8th and 9th, PHILADELPHIA.



PATENTED
Scand. Pad Locks
With Flat Keys.
Shackel secured to the Lock Box.

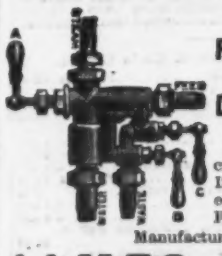
HILLEBRAND & WOLF.

PATENTED
C-SPRING CART CO.,
RUSHVILLE, IND.

We are making a Road Cart that is strong, light, easy on the horse and rides as easy as a buggy. Easy to get in and out of. Cut shows No. 3, with seat swung back ready to enter. Write for catalogue and prices.

GUN POWDER.
Laflin & Rand Powder Co,
No. 99 Murray Street, New York,
Manufacture and sell the following celebrated brand of Sporting Powder known everywhere as
ORANGE LIGHTNING,
ORANGE DUCKING,
ORANGE RIFLE
more popular than any Powder now in use.
Blasting Powder and Electrical Blasting Apparatus.
Military Powder on hand and made to order
SAFETY FUSE, FRICTIONAL & PLATINUM FUSES.
Pamphlets showing sizes of grain sent free.

THE DUPLEX INJECTOR.
SIMPLE, RELIABLE AND DURABLE.



The constantly increasing Sales of this Injector attests its Superiority as a Boiler Feeder.

Manufactured by
JAMES JENKS,
48, 50, 52 and 54 Randolph St.,
DETROIT, MICH.

PATENTS.
Experienced in soliciting United States and Foreign Patents prior and subsequent to service in United States Patent Office. **Personal attention** to every case from beginning to end. Practical and theoretical knowledge of the mechanic arts. Prompt and skillful prosecution of applications for **Patents, Designs, Trade-Marks** and **Labels. Expert Searches and Opinions** as to scope, validity and infringement. Representatives in over thirty foreign countries. Terms reasonable, and always agreed upon before any expense is incurred. Send for circular. **Ten Years' Experience.**

E. B. STOCKING,
Attorney-at-Law,
Opp. Patent Office, WASHINGTON, D. C.

MANUFACTURERS OF
NORWAY IRON RIVETS
AND BURRS,
AND ALL SIZES OF
WROUGHT IRON WASHERS
GENERAL NEW ENGLAND AGENTS:
JOHN WALES & CO.,
239 & 241 Franklin St., - Boston, Mass.
WESTERN AGENT:
S. E. BLISS, 89 Lake St., Chicago, Ills.

This Band Saw has a 30-inch wheel, covered with rubber. Saws 12 inches wide. Both wheels are adjustable, the upper one by a thumb-screw by which the saw can be run anywhere on the wheel, the lower one by three screws at either end of frame. Both wheels run in boxes of the best babbit metal. The upper spindle is of steel, the lower of hammered iron. The slides are bolted on the frame, and the wear can be taken up. The upper end of screw has a rubber spring, which allows the saw to give at any sudden jar, and prevents the saw breaking. The frame is heavy and stiff, and weighs nearly 700 lbs. The tight and loose pulleys are 12 inches in diameter, and should make 450 revolutions per minute. We send one pair Brazing Tongs, Form, two Clamps, and Silver enough for twenty welds with every Saw.

SNIGGS & CO., 210 Terrace, Buffalo, N. Y.

Geo. A. Boynton,
BROKER IN IRON
70 WALL ST, N.Y.

BOSTON.

Reported by Macomber, Bigelow & Dowse.

Anvil & Vise.—
No. 1, $5.25; 2, 4.25; 3, 3.50 each.....dis 25 %

Augurs & Bits.—Snell's Auger.....dis 40&10 %
L'Hommedieu's Ship Auger.....dis 15 %
Jenning's Bitts.....dis 10&10&10 %
Cook's Bitts.....dis 40&10 %
Shepardson's Double-Cut Bitts.....dis 45 %
Shepardson's Double Gimlets.....dis 40 %
Stearn's Extension Hollow Augers—
No. 2, ₩ doz., $24.00; No. 3, ₩ doz., $60.00 list..dis 20 %
Bonney's Extension Hollow Augers.....₩ doz $36.00
Pierce's Bitts.....dis 50 %
Griswold Bitts.....dis 60 %

Axes.—Blue Jackets.....₩ doz $9.00
Red Cross.....₩ doz 8.00
Red Cross Handled.....₩ doz 12.00
Dowse Handled Boys'.....dis 33⅓ %

Ax Handles.—
Oak Extra, 32 in., No. A.....₩ doz $2.50
Oak Extra, 34 in., No. A.....₩ doz 2.50
Oak Extra, 32 in., No. B.....₩ doz 2.00
Oak Extra, 34 in., No. B.....₩ doz 2.00
Oak Extra, 32 or 34 in., No. C.....₩ doz 1.40

Axle Clips......dis 50 %
Balances.—Chatillon's.....dis 33⅓ %

Barn Door Rail.—
Cast Angle (for Anti-Friction Hangers).....7 ft. 30
Cast Half Round.....₩ ft., ⅝, 30; ⅞, 40
Wrought Round.....₩ ft., ⅝, 30; ⅞, 40; 1, 50

Belts.—Connel's Crank Gong, reduced list..dis 15&10 %

Bird Cages.—
Japanned M. B. & D., reduced list, 1879.....dis 40 %
Brass M. B. & D., reduced list 1879.....dis 33⅓ %

Blind Fasts.—Lock Fasts.....₩ C sets $6.00
No. 6 Fasts.....₩ C sets 6.00
Veazie Fasts.....₩ C sets 6.00
Shedd's.....₩ C sets 7.00
Blind Hinges.—Mall, Hook, 3 holes.....₩ C sets 7.00

Brad Awl Handles.—
Phœnix Adjustable.....₩ doz $2.00

Bolts.—Norway Iron Carriage.....dis 75 %
Common Iron Carriage.....dis 60 & 10 %
Borax.—Refined.....₩ lb 15c

Boring Machines.—
Eagle Upright each.....$5.50 list } dis 40&10 %
Eagle Angle each.....6.75 list }
Snell Augers.....₩ set $2.45

Braces.—Barber's.....dis 40&5 %
Spofford's.....dis 40&5 %
Backus'.....dis 50&5 %

Bracket Saws.—Holly Scroll Saw.....each $2.25
Demas Lathe and Scroll Saw.....each 6.50
Bracket Saws, extra quality, to No. 5.....₩ gro 0.75
Steel Frame, with patterns.....₩ doz 6.50
Lester.....dis 20 %
New Rogers, all iron.....dis 25 %

Bracket Saw Blades.—Griffith's pat.....₩ gross 7.50

Brackets.—
B. B. & M. Flower Pot, reduced list.....dis 15&10 %
Bronzed Shelf, M. B. & D., new list.....dis 50 %
Store Shelf.....dis 30 %

Butts.—Union Fast Joint.....45&10 %
Union Loose Joint.....dis 45&10 %
Union Japanned Acorn.....dis 55&10 %
Union Silvered Acorn.....dis 55&10 %
Union Boston Finish.....dis 70&10 %
Union Spiral Spring.....dis 25&10 %
Wrought Brass.....dis 65& 10%

Carriage Bolts.—Eagle Norway.....dis 70&10 %
Common.....dis 80 & 5 %

Carriage Jacks.—Climax No. 1.....₩ doz $2.00
Climax No. 1½.....₩ doz 15.00
Climax No 2.....₩ doz 13.50
Universal.....dis 25 %
Universal No. 1.....each $2.00
Universal No. 2.....each 4.00
Universal No. 3.....each 6.00
Universal No. 4.....each 8.00
Universal No. 6.....each 6.00

Cartridges.—U. S. Cartridge Co.....dis 75 %

Cards.—
Watson's make Horse & Curry...dis 10 %
Watson's Cotton.....dis 10 % } New List, July, 1881.
Watson's Wool.....dis 10 %

Casters.—Bed and Table.....dis 50 %

Chain.—Traces 6½, 10, 4, straight.....₩ pair 50c
Traces 6½, 10, 4, twisted.....₩ pair 55c
Traces 7, 12, 2, twisted.....₩ pair 80c
Coil 3-16.....₩ lb 12½c
Coil ¼.....₩ lb 8½c
Coil 5-16.....₩ lb 7c
Coil ⅜.....₩ lb 6½c
Coil 7-16.....₩ lb 6c
Coil ½.....₩ lb 5½c
Chain.—White, Carpenter's.....₩ gross 60c
Red, Carpenter's.....₩ gross 80c
Blue, Carpenter's.....₩ gross $1.00
Chisels.—Hart, Bliven & Mead, Framing..dis 60&10&10%
Underhill, Framing.....dis 25 %
Buck's Chisels.....dis 40 %

Clothes Line.—
Galvanized Wire, 100 feet each.....₩ doz $4.00

Coal Hods.—"Dover."—Galvanized, New List.dis 50%
Japanned, new list.....dis 60 %
Coffee Mills.—New List.....dis 45 %
Copper Rivets.....dis 40 %
Cow Ties.....dis 33⅓ %
No. 30, 3 ft. No. 6 Wire, with toggle.....₩ doz $3.60
No. 35, 3 ft. No. 6 Wire, with snap.....₩ doz 4.00
No. 40, 3½ feet No. 6 Wire, with toggle.....₩ doz 4.50
No. 45, 3½ ft. No. 6 Wire, with snap.....₩ doz 4.50
No. 50, 4 ft. No. 4 Wire, with toggle.....₩ doz 4.75
No. 55, 4 ft. No. 4 Wire, with snap.....₩ doz 5.00
No. 60, 4½ ft. No. 3 Wire, with toggle.....₩ doz 5.50
No. 65, 4½ ft. No. 3 Wire, with snap.....₩ doz 5.80
Cocks.—Brass. L. F. & Co.....dis 40&10 %
Cordage.—Manila, usual trade dis 10.....₩ lb 15½c
Jute.....₩ lb 9c
Crow Bars.—Cast Steel.....₩ lb 7½c
Iron Steel pointed.....₩ lb 5c

Cutlery.—Pocket American Shear Co.'s.....dis 40 %
Butcher Knives Wood's, Lap Bolster, Square Handle.....dis 30 %
Steak Knives.....dis 25 %
Lap Bolster, Oval Handle.....dis 20 %
Sticking.....dis 20 %
Skinning.....dis 30 %
Butcher, Common Round Handle, Wood's.....dis 20 %
Shoe Knives, Wood's.....dis 20 %

Dividers.—Cook's.....dis 25 %

Dog Collars......dis 20 %

Door Springs.—Torrey's Rod.....₩ doz $1.60
Imitation Torrey's Rod.....₩ doz 1.45
Gem Coil, new list.....dis 50 & 10 %
Crown.....₩ doz 1.25
Warner's.....₩ doz 2.00

Door Stops.—Thurston's.....dis 50 %

Drawer Knobs.—Thurston's.....dis 50 %

Drills.—Morse Bitt Stock.....dis 25 %
Morse Straight Shank.....dis 20 %

Emery.—Wellington Mills.....₩ lb 10c
Walpole Emery Mills.....₩ lb 6c
Turkish in 10 lb cans.....₩ lb 8c

Enameled Ware.—
Standard Mfg. Co. Kettles.....dis 10 & 10 %
Standard Sauce Pans.....dis 30 %

Felloe Plates.—Wrought.....₩ lb

Files.—American File Co.....dis 40 %
Nicholson File Co.....dis 5 %

Fluting Machines.—Knox list, $4.00.....dis 20 %
American list, $3.40.....dis 20 %

Forks.—W. C. & Co. Manure.....dis 50 %

Gimlets Bits.—
Genuine German, No. 124, 1-32 to 8-32, per doz $1.0
Pierce's.....per doz .85

Glass Cutters.—Combination Glass Cutter and Knife Sharpener.....₩ doz $1.00

Grub Hoes.—K. P. & Co.'s No 2, $11.50 ₩ doz.dis 40 %

Hammers.—Maydole's.....dis 15 %
Hartford Hammer Co.....dis 20 %

Hangers & Rollers.—Anti-Friction.....dis 40 %
Acme Rollers.....dis 50 %
Climax.....dis 50 %
Common Hangers.....dis 50 %
Common Rollers.....dis 50 %

Hand Screws......dis 10 %

Hatchets.—C. F. Dowse new list.....dis 33⅓ %
Underhill.....dis 30 %

Hay Knives.—Lightning.....₩ doz. $18.00, net
Fisher's Patent.....₩ doz $14.00

Hinges.—Strap and T (new list).....dis 60 %
Providence Plate.....₩ lb 5 %
Wrought Screw Hook.....₩ lb 5 %

Hoes.—W. C. & Co.'s.....dis 60

Hooks and Staples.—Brewers' (new list).....dis 60

Horse Nails.

	No. 5	7	8	9	
National Finished	.23	.21	.20	.19	dis 20 %
Putnam Pointed	.24	.22	.21	.20	5 %
Bridgewater	.21	.19	.18	.17	list

Ice Cream Freezers.—Packer's, new list.....dis 50 %

Knobs.—"Norwalk." New list.....dis 45 %
Silver Glass.....dis 50&10 %
Silver Glass Bell Pulls.....dis 50&10 %

Lanterns.—Tubulars, No. 0.....₩ doz. 8.00
Railroad, Oil, No. 43.....₩ doz. 9.00
Triangular.....₩ doz 4.00

Lawn Mowers.—The "Daisy."
12 in. cut.....each, $8.00
14 in. cut.....each 12.00
16 in. cut.....each. 9.00
18 in. cut.....each, 9.50

Lead.—Sheet.....₩ lb 7½c
Pipe.....₩ lb 6½c

Locks.—Norwalk.....dis 45 %
Eagle Cabinet.....dis 25 %
Eagle Trunk.....dis 15 %
W. Wilcox & Co., Padlocks.....dis 70 %

Manure Forks.—W. C. & Co.....dis 60 %

Mattocks.—
K. P. & Co., Long Cutter, $16.00 ₩ doz.....dis 50 %
K. P. & Co., Short Cutter, $15.50 ₩ doz.....dis 50 %
K. P. & Co., Pick Cutter, $16.00 ₩ doz.....dis 50 %

Measuring Tapes.—Eddy's.....dis 20 %

Meat Cutters.—Miles' Challenge.....dis 30 %
Hale's, (new list).....dis 40 & 10 %
American.....dis 25 %

Money Drawers.—Tucker's Am.....₩ doz $22.50

Mouse Traps.—Delusion.....₩ doz 1.40
Novelty.....₩ doz

Nails......₩ keg 3.40

Oilers.—Zinc and Tin.....dis 60 %
Brass and Copper.....dis 40 %

Ox Bows.—Extra finished and varnished.....dis 10 %
1¼ in., ₩ doz. pair..$7.00 | 2 in., ₩ doz. pair. $10.00
1¾ in., ₩ doz. pair... 9.00 | 2½ in., ₩ doz. pair . 13 00

Paper.—Tarred Sheathing.....₩ lb 2½c
Tarred Eagle Brand.....₩ lb 2½c

Picks.—K. P. & Co., Adze Eye, 4 to 6 lb $12.00.....dis 50 %
K. P. & Co., Adze Eye, 6 to 7 lb $13.00.....dis 50 %

Planes.—
Fancy Planes.....dis 15 %
Razee Planes.....dis 20 %
N. Y. Tool Co.....dis 25 %
English Iron.....dis 20 %
Bailey's.....dis 20&10 %

Plated Ware.—Rogers & Bro.....dis 40&5 %

Pliers.—Vom Cleff & Co.'s.....net list
Button's Wire Pliers.....dis 33⅓ %

Plumb & Levels.—Stanley R. & L. Co...dis 65&10 %

Pocket Knives.—American Shear Co.'s.....dis 40 %

Potato Diggers.—W. C. & Co., reduced list..dis 10 %

Pulleys.—Acme or Excelsior, 1¾ in.....₩ doz 24c
Acme or Excelsior, 2 in.....₩ doz 27c

Pulley Blocks......dis 35 %

Pumps.—Union Manufacturing Co.
Iron Cistern.....dis 40 %
Iron Pitcher Spout.....dis 45 %
Copper.....dis 30 %

Rivets.—Black (new list).....dis 40 %
Carriage in 10 lb papers (new list).....dis 40 %
Copper.....dis 33⅓ %

Razors.—Torrey's.....dis 20 %

Razor Straps.—Torrey's.....Full line

Rules.—Stanley, Boxwood.....dis 70 &10 %
Stanley, Ivory.....dis 54&10 %

Sad Irons.—Common.....₩ lb 3½c
Laundry.....₩ lb 6½c
Tailors' Geese.....₩ lb 6 c
Enterprise, "Potts".....dis 35 %

Sash Locks.—King & Hutchinson's, new list.dis 40 %
Sandpaper.—Bauder & Adamson.....dis 30 %
M. B. & D.....dis 33⅓ %
Sash Weights.—Patent Eye.....₩ lb 1½c
Saws.—Hand Saws, Disston's.....dis 20 %
Wheeler & Clemson.....dis 20 %
Cross-Cut Saws.
W. M. & Co., Common Tooth, No 1.....₩ foot 35c
W. M. & Co., Champion Tooth.....₩ foot 35c
Disston's, Common Tooth.....₩ foot 60c dis 40 %
Disston's Great American Tooth...₩ foot 60c dis 40 %
Boynton's Lightning Tooth.....₩ foot 45c
M. B. & D., Hand Saws.....dis 33⅓ %
W. M. & Co.'s Circular Saws.....dis 35 %
Richardson Bros.....dis 25 %

Saw Blades.—Disston.....dis 20 %
W. M. & C.....dis 10 %
Welch & Griffith, Extra.....₩ doz $2.40
Welch & Griffith, No. 2.....₩ doz 1.00

Scales.—Fairbanks.....dis 20 %

Screws.—Aiken's Flat-Head Iron new list, dis 50 & 10 %
American Flat-Head Iron.....new list, dis 50 & 10 %
American Flat-Head Brass.....new list, dis 50 & 10 %
American Round-Head Brass...new list, dis 40 & 10 %
American Round-Head Iron...new list, dis 45 & 10 %
Grilley Round Head Nickel-Plated Common..dis 40 %

Scythes.—Clippers, in boxes.....₩ doz $6.75

Shavers.—Kimball's.....₩ inch 75c
Watrous.....dis 15 %

Shears.—American Shear Co., new list.....dis 70 %

Shot.—Tatham's.....₩ lb 9c

Shovels.—O. Ames, new list.....dis 15 %
O. Ames, other brands, new list.....dis 15 %
M. B. & D.....dis 15 %

Sinks.—Magee Patent.....dis 30 %

Snow Shovels......$4.00

Skates.—Union.....dis 25 %
Acme.....dis 25 %
Imperial Club list No. 5, $3.75 ₩ pair; list no. 7, $5.00 ₩ pair.....dis 25%

Stocks and Dies.—King's.....dis 10&5 %

Tacks.
Swedes Tinned.....dis 30&10 %
Swedes Iron.....dis 30 & 10 %
Gimp and Lace.....dis 20 & 10 %
Copper Tacks.....dis 30 & 10 %
All balances on list.....dis 30&10 %

Traps.—Oneida, Genuine.....dis 33⅓ %
Oneida, Imitation, H. & N.....dis 50 %
Blake's.....dis 40&10 %

Vises.—Simpson's Adjustable.....dis 30&5 %
Howard Vise Co.....dis 25 %
Prentiss'.....dis 20 %

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In 25 feet boxes: No. 1, ⅜ in. wide, ₩ yard, 10c.; No. 2, ½ in., 14c.; No. 3, ⅝ in., 20c.; No. 4, 1 in.....24c
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Babcock's No. 3.....₩ ½ ross $6.25
Babcock's No. 4.....₩ gross 4.15

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Novelty No 2 for Common Tubs.....₩ doz 42 00
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Excelsior F " " " .....₩ doz 57.00
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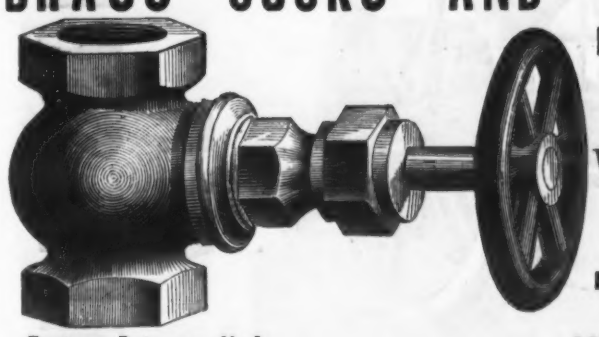

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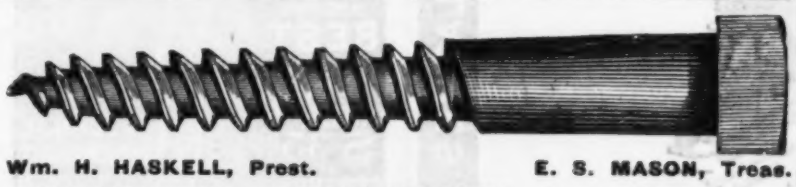

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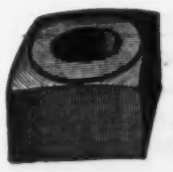

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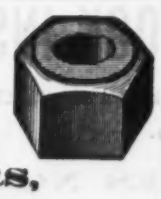

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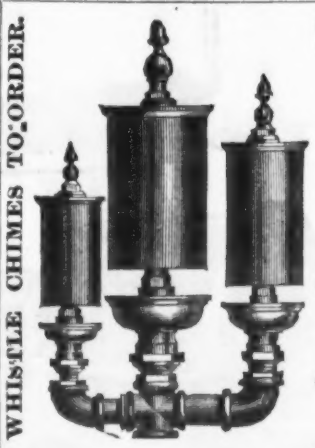

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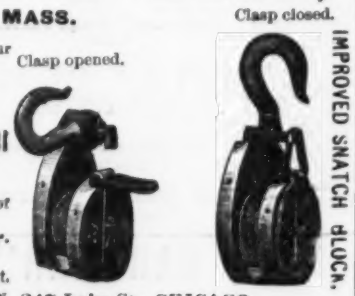

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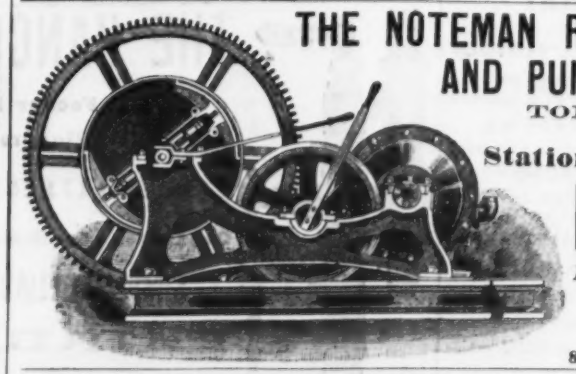

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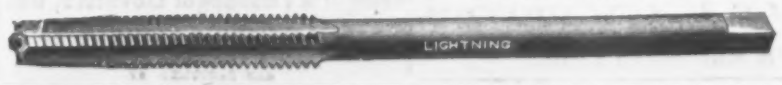

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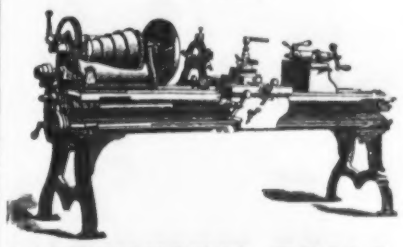

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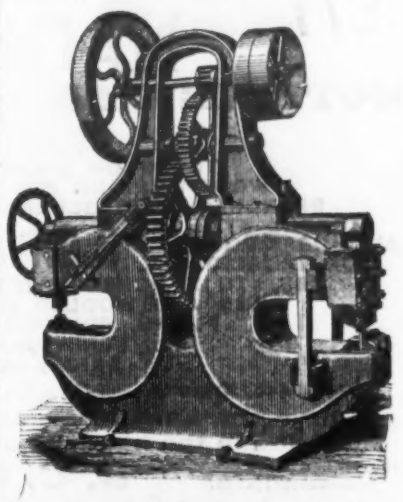

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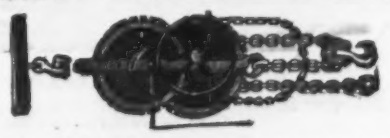

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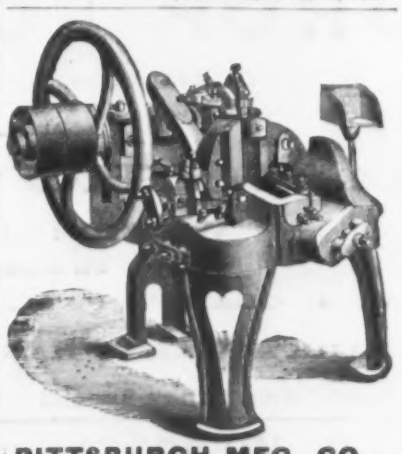

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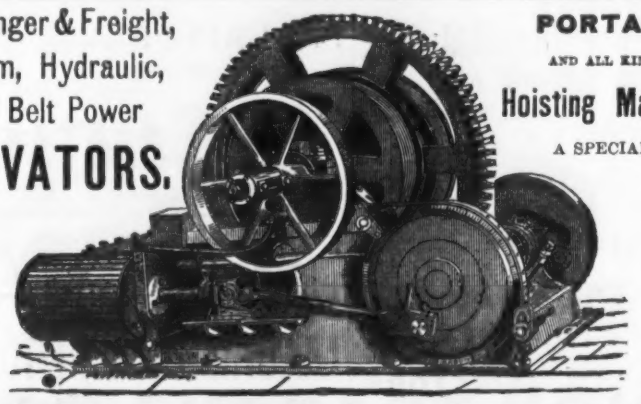

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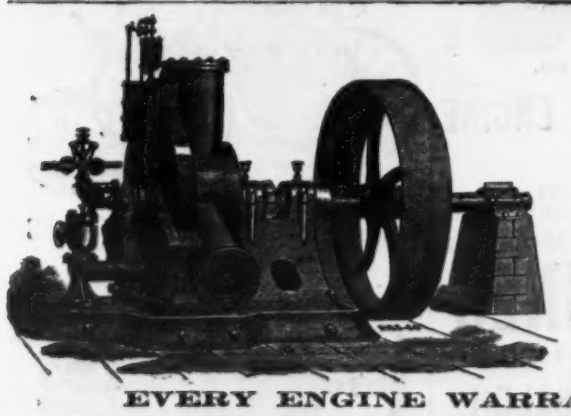

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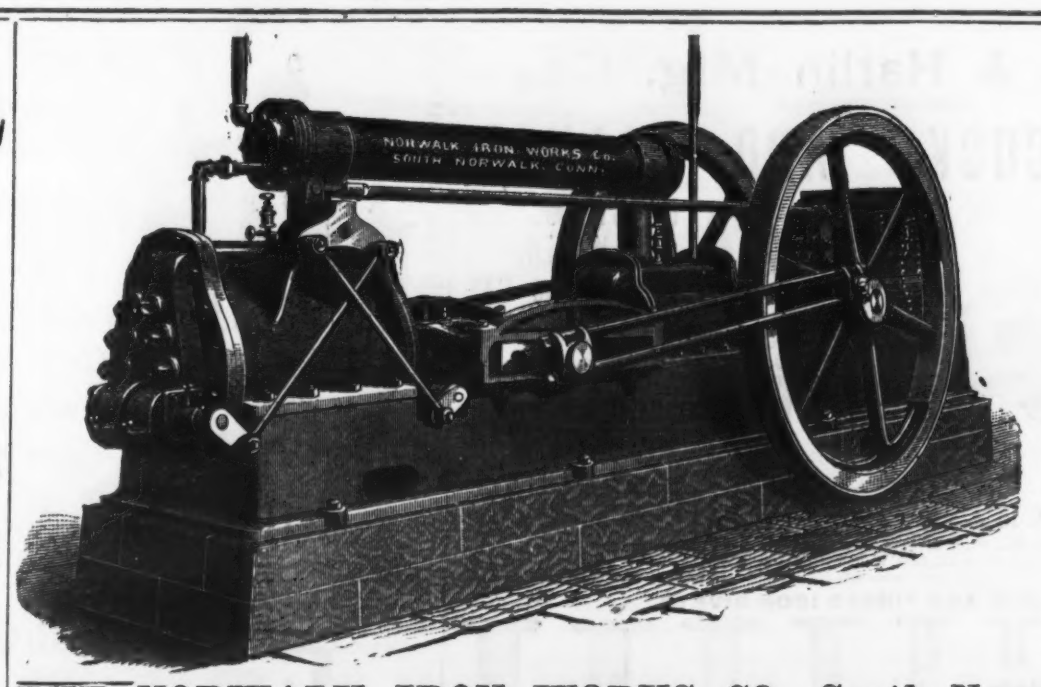

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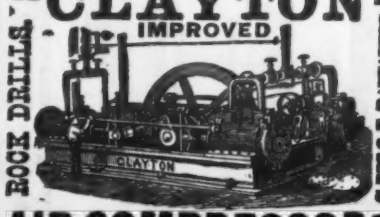

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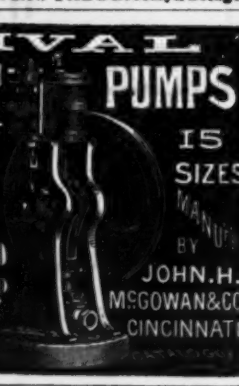

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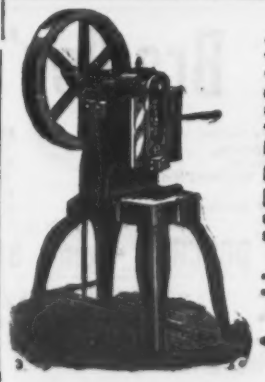

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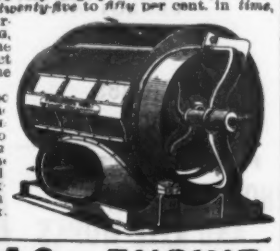

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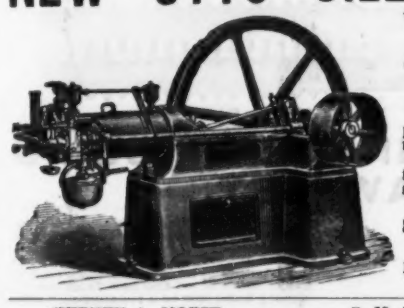

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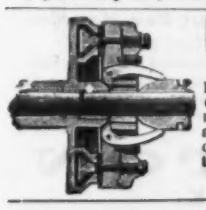

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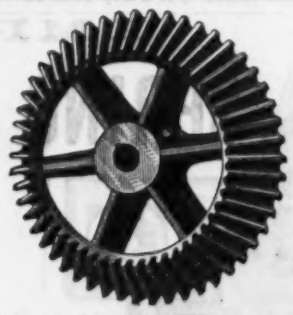

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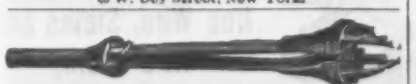

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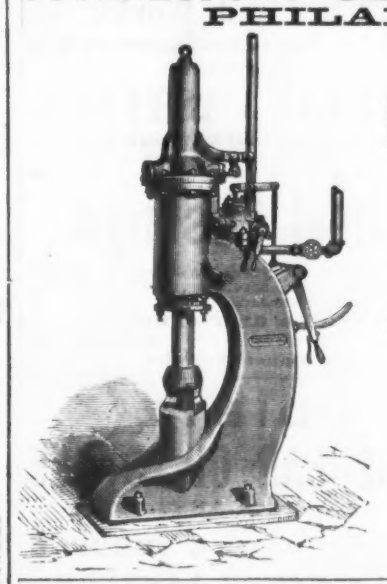

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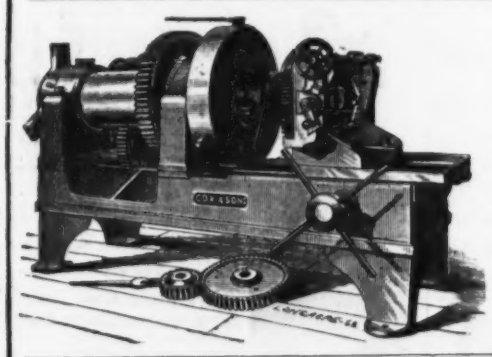

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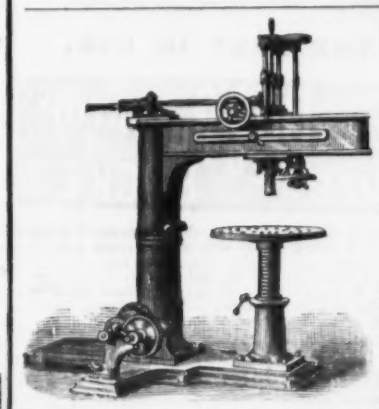

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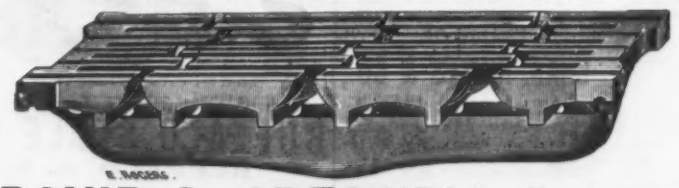

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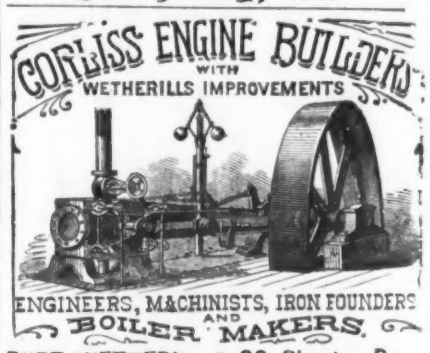

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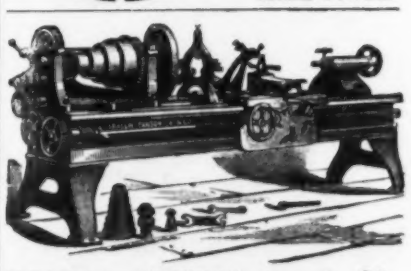

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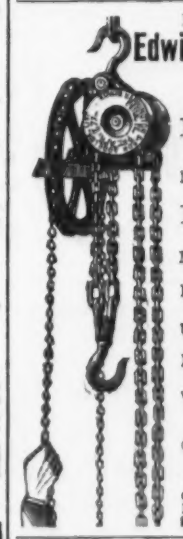

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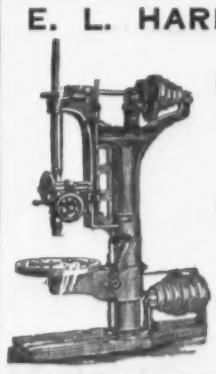

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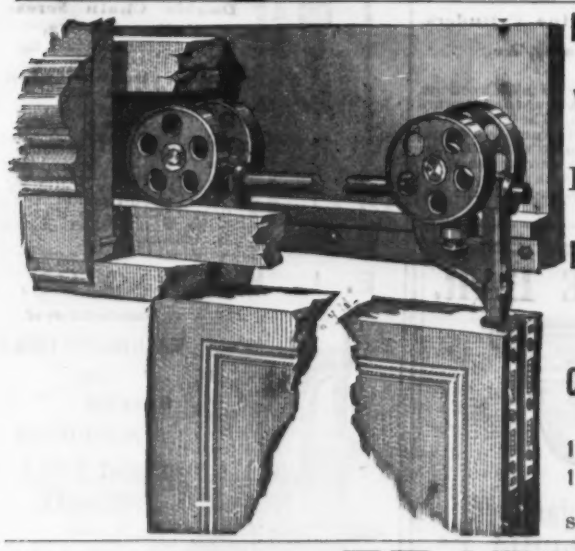

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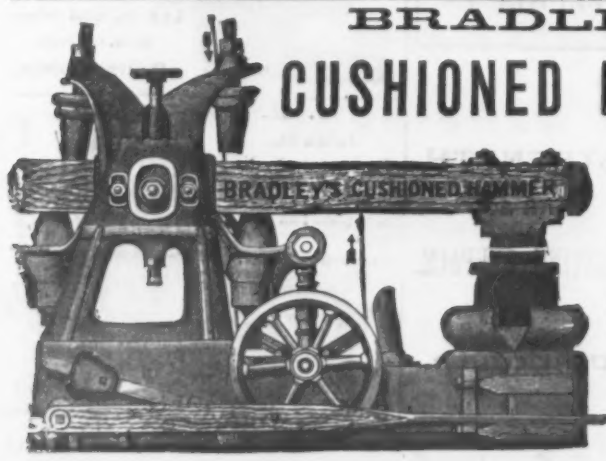

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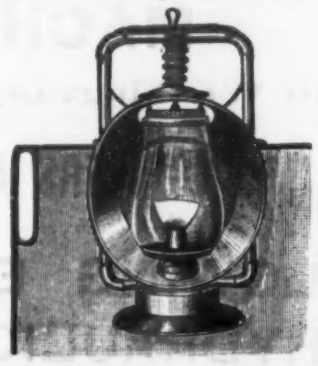

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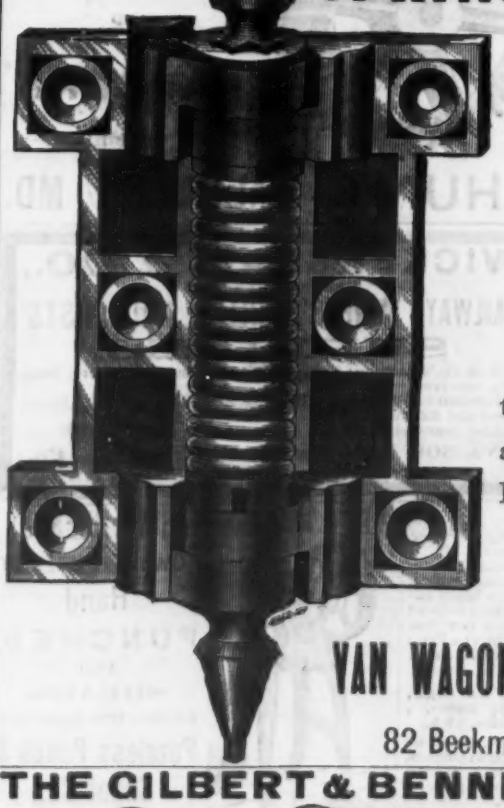

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